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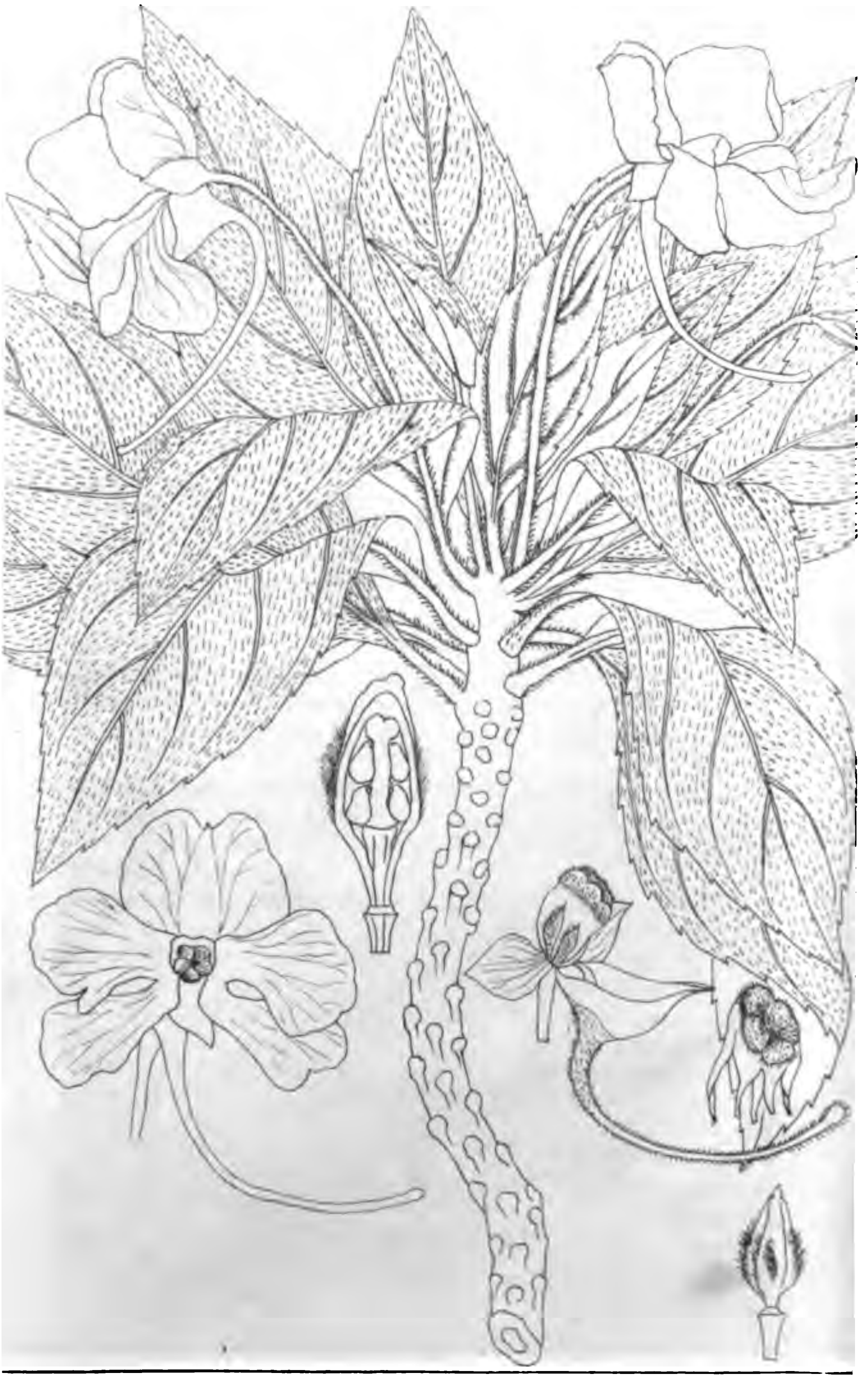

I. Albida.

MADRAS JOURNAL

OF

LITERATURE AND SCIENCE.

No. 14.—*January*, 1837.

I.—*Contributions to Indian Botany*, No. I.—*By* ROBERT WIGHT, M. D., F. L. S., &c. &c. *Member of the Imp. Acad. Naturæ Curiosorum. Surgeon on the Madras Establishment.*

On the Genus Impatiens.

The Genus *Impatiens*, from occupying a prominent place in the Indian Flora, as well as from being in a great measure confined to this country justly claims for itself, in a proportionate degree, the attention of the Indian Botanist.

On this account, I have selected it for the first of a series of papers, to be continued from time to time, under the above title, in which it is my intention to give descriptions and illustrations of such new, or otherwise interesting plants, as I may chance to obtain, whether collected by myself, or communicated by friends, desirous of lending their assistance to the advancement of a highly interesting and useful science. Its selection, for the commencement of the series, is rendered still more appropriate, by the circumstance of its extent, as well as the peculiarities of its structure, being nearly unknown, till within these few years.

Of this genus, now embracing nearly one hundred species, Linnæus only knew seven or eight; and most of these from indifferent figures. In 1805 when Persoon published his Synopsis, ten only were known; to these only six had been added in 1819, when Roemer and Schultes published the fourth volume of their *Systema Vegetabilium*, and one of the six " sine definitione." In 1824, Professor Decandolle published the first volume of his *Prodromus*, and extended the catalogue from sixteen to thirty-one, excluding the undefined one, thus doubling the former number: of these, twenty-four are Indian, nearly all the new ones being derived from Dr. Wallich's Nepaul Collections. In 1830-31, Dr. Wallich named in his list no fewer than forty-seven Indian species. Since that time Mr. Royle informs us, (*Illustrations* page 151) that his collection contains several not in Wallich's list, and Mr. Arnott writes me that he has recently described sixteen new ones from Ceylon. To these last, my excursions on the Courtallum and Shevagerry hills have added about as many more. Of the Courtallum ones, those only of which drawings were made, are introduced into this paper; not having, either specimens or sufficiently perfect notes, to enable me to define the rest. This defect I regret the less, as I expect to have yet many more to add to the list, and will avail myself of an opportunity of making them known, and I hope at the same time, to revise the whole of the peninsular portion of the genus.

As already observed, the peculiarities of the flower of the *Balsaminiæ*, were, till lately, as little known as the number of its species. Linnæus, and subsequently Schreber, in the *Genera Plantarum*, describes the flower of *Impatiens* as being composed of two small lateral sepals, five petals, and a nectary: the petals are said to be one above, two below, forming a lip, and an intermediate pair between these and the upper one, the nectary or spur between the lower pair; thus viewing each of the lateral two-lobed petals as two. Decandolle, following Jussieu, assigns to it two lateral sepals, and four petals—one above, one below, ending in a spur, and two interior, more petaloid ones, alternate with the other two: generally either cleft or furnished with some other appendage. In 1827, Professor Kunth published a memoir on the subject, in which he takes a different view from either of these, assigning to it five sepals and four petals, the fifth petal, required to make up the normal number, being absent from abortion. The following extract from Lindley's Introduction to the Natural System of Botany, will explain how he arrives at this conclusion: "The fact is, that the structure is usually this: the centre of the flower is occupied by an ovarium, surmounted by a stigma divided into five acute lobes. Around this stand five hypogynous stamens, placed in a single row at equal distances from each other. Hence the normal number of the parts of the flower should be five. The corolla, however, consists of two bifid petals placed right and left, with a wider space between their upper than lower edges. Upon comparing the position of these with the stamens, it appears that each occupies the place of three stamens, whence it is impossible to doubt, that they consist of two soldered together. On the other hand, the space between them, which answers to two stamens, is an equal proof of the abortion of the fifth petal. And this view of the structure is confirmed by the sepals. Thus on the outside of each pair of petals, at their base, is found a leaflet, the situation of which is opposite a stamen; and opposite the space left by the abortion of the fifth petal, is a large broad leaflet, made up by the union of two sepals. The position of the fifth sepal, which is that which is spurred, is between two petals and opposite a stamen." It is only necessary to add, that the correctness of the deductions obtained from this most masterly analysis of the flower of the common Balsam, is now completely proved by the structure of the genus *Hydrocera*, the only other genus of the order, which enjoys the full compliment of parts, namely, five sepals, five petals, five stamens and five stigmas, with a truly five-celled fruit, not like *Impatiens* opening with elasticity.

I have thought it necessary to introduce this explanation of the structure of the flower of *Impatiens*, partly with the view of exhibiting an excellent example of botanical analysis, but principally, to enable such of my readers as may not have had an opportunity of becoming acquainted with it, more readily to accompany me, when perusing the following descriptions. I do not, however, intend to adopt the language which it points out as strictly correct, but shall continue to employ nearly the same terms as those used in my *Prodromus*, in which the two united petaloid sepals are called the posterior or upper sepal; the lower one, the spur, in all cases where that organ is so much developed, as to leave no evident foliaceous portion, as is the case in nearly all the following species. The united pairs of petals are considered single two-lobed ones, and the lobes indicated by the terms upper and lower. As it is from the relative sizes of these parts that the best specific marks are obtained, and as they will be found introduced into the character of each species, I have been thus particular in explaining the names under which they appear. So numerous, indeed, and at the same time so constant, are the variations in form, which these parts assume in different species, that, with the exception of those taken from the general habit of the plants, no other part need be mentioned in characterizing them. But as most of those now known, are taken up from dried specimens, in which it is always difficult, and often impossible, to make out the characters of the flower, I have added all those procurable from other parts of the plant, as the only inconvenience attendant on their introduction is, the length to which the definitions are thereby extended; a fault, which is more than compensated by the facility of correctly discriminating species in such a large and daily increasing genus; and, by affording those who may possess dried specimens, the means of referring them to their proper species.

It is a curious, and to me an inexplicable fact, that a genus so strikingly Indian, and associating such a host of species, should have been so little known to Roxburgh. He only describes three in his Flora, though I am sure I speak within bounds, when I assert that the countries, whence he derived the materials for his work, will be found to present an assemblage of not fewer than one hundred species. It is no doubt an eminently alpine genus, delighting in a cool and moist climate;

hence it is unknown on the plains of Coromandel, though not unfrequent in Mysore, but, so far as I have seen, only abounding, in the peninsula, on the higher hills participating in the western monsoon, which enjoy, during the hot months, a moderate range of temperature, with a very humid atmosphere. Some, how many is not yet known, are found during the monsoon on the Malabar coast, but little elevated above the level of the sea, but, except in Tanjore, I have not seen one of the order on the plains eastward of the ghauts, beyond the influence of that monsoon: and the only one found there, is the *Hydrocera triflora,* which grows, but is not common, in its ditches and swampy grounds, during the cool season, and is the only place where I have yet seen it.

This peculiarity of distribution may account for his not having met with peninsular species, as he was but little in the southern provinces, and perhaps they are not found in the eastern range of the northern ghauts: but, twenty-two of the forty-seven species named by Wallich, are from Silhet, Pundooa and Nepaul, from all of which places Roxburgh procured plants, and one of the three he describes is from Silhet. A moist climate and moderate temperature are the circumstances most favourable, if not indispensable, to their production; hence we find twenty-two, of the remaining twenty-five species named by Wallich, natives of the peninsula, but confined to the ghauts and Mysore where these contingencies meet. This fact was first noticed by Mr. Royle, who, after remarking the nearly equal division of the forty-seven species between the frontier mountains of Bengal and the peninsula, adds, "a singular equality of numbers, seeing that we have hitherto found peninsular and South of India genera confined to the base of the mountains, and if found existing on them, generally only as single species; but here we have them in equal numbers, some of them extending to an elevation of seven thousand feet.

"This anomaly can only be explained, and a stronger fact cannot be adduced in its confirmation, than that the moisture and moderate temperature of the rainy season in the hills (for it is at this season only that they are found) is as favourable to their growth as the heat and moisture of the peninsula. I have never met with any in the plains of India; but have heard from travellers that they are abundant in Central India, whence we may expect some new species, as well as from the Neilgherries."

The facts which I have mentioned regarding the distribution of the peninsular species, go to prove, that heat and moisture are not the circumstances most favourable to their production here, but moisture combined with a moderate but equal temperature. At Courtallum for example, whence I have eleven or twelve species, they most abound in shady places on the tops of the hills, with a mean temperature during the season of their greatest perfection, not exceeding 70°, if so much. At Shevagerry, about fifty miles north of Courtallum, I found five, out of seven species, on the highest tops of the mountains; none of the five under 4,000 feet, and three of them above 4,500 feet of elevation; the mean temperature, as deduced from twenty observations, continued through four days, at an elevation of 4,100 feet, being 65° of Fahrenheit's scale. The two found at a lower elevation, were both either growing in the gravelly beds of streams, or immediately on their banks; the temperature of which was ascertained to be 65°, while that of the air at noon was only about 75°, a temperature, I presume, but little above that in which they delight on the Bengal frontiers. There is one other point, respecting the effect of climate on plants of this genus, to which I wish to call attention, as it may ultimately prove useful to any one who may again attempt to subdivide it, and is, in the mean time, in a physiological point of view, exceedingly curious. It is, that most of the species from the colder regions of the Himalaya mountains, correspond with the European I. *noli tangere*, in the form and dehiscence of their capsule, that is, they split from the base, rolling the segments towards the apex, while those of the warmer regions split from the apex and roll their segments towards the base. This difference of habit between those of India proper and the Himalayan forms, is well worthy of notice, as it shows, that the affinity which exists between the flora of the latter and that of Europe, is stronger than between it and the Indian, and extends to even this most purely tropical genus.

The innate power which plants enjoy of selecting the soil and climate in different countries, however remote, most suitable to their perfect development, and which the preceding remarks have shown to be so eminently possessed by those of this order, may, when the subject has been more studied and is better understood, prove of immense benefit to the scientific cultivator.

Taking for an example the genus *Impatiens*, we may at once infer, that herbaceous plants growing where its species abounds, and arriving at maturity about the same time, may be transferred to any other locality, where they are equally prevalent. Thus the associates of I. *noli-tangere*, *insignis*, *racemosa* and *bicolor*, might be mutually interchanged; while the neighbours of I. *reticulata*, *puberula*, &c. might be made to change places with those of I. *fasciculata*, *grandis*, and many more, with every prospect of success. The limits to which this rule may be extended are as yet totally unknown, and cannot be estimated, until plants are studied not as insulated individuals, but in connexion with the soil, climate, aspect, exposure, &c. in which they are observed to arrive at the greatest perfection. This is a study which the scientific botanist pursues in its relations to the physiological peculiarities of plants, but to the cultivator, it becomes one of much deeper and more engrossing interest, as the success or failure of vast speculations may depend on his acquaintance with, or ignorance of, the external agents which act on the objects of his culture—whether for their benefit or their injury.

Should any one doubt the correctness of this statement, I would refer him to the *too short*, but luminous paper of Mr. Piddington* on the analysis of soils suitable for cotton, tobacco, &c. where he will find most ample and irrefragable proofs of their truth—a paper, that, in my opinion, cannot be too extensively made known, and one, my ignorance of which, when I wrote my desultory remarks on the culture of cotton, published in No. 12 of the Madras Journal, I now greatly regret. The study of plants, in relation to the agents that either promote or impede the attainment of their greatest perfection, is necessarily a difficult and tedious one, from the diversified attainments which the enquirer must bring to his aid, and from the prolonged meteorological investigations which are indispensable to its completion; but it is one, which, there is every reason to believe, will much more than repay the cost.

SYNOPTICAL ARRANGEMENT OF SPECIES.

§ 1 *Leaves alternate, pedicels solitary or aggregate, one flowered.*

1. IMPATIENS *albida.*
2. „ *dasysperma.*
3. „ *floribunda.*

§ 2. *Leaves alternate, peduncles two flowered, upper sepals herbaceous (green).*

4. IMPATIENS *auriculata.*
5. „ *viridiflora.*

§ 3. *Leaves alternate, peduncles several flowered, upper sepals petaloid.*

6. IMPATIENS *umbellatta.*
7. „ *grandis.*
8. „ *cordata.*
9. „ *uncinata.*
10. „ *companulata.*
11. „ *viscida.*

§ 4. *Leaves alternate, flowers racemose.*

12. IMPATIENS *maculata.*

§ 5. *Leaves radical, scape racemose.*

13. IMPATIENS *modesta.*
14. „ *rivalis.*

§ 6. *Leaves opposite, pedicels one flowered.*

15. IMPATIENS *fasciculata.*
16. „ *rosmarinifolia.*

§ 7. *Leaves opposite or verticelled, pedicels several flowered.*

17. IMPATIENS *verticellata.*

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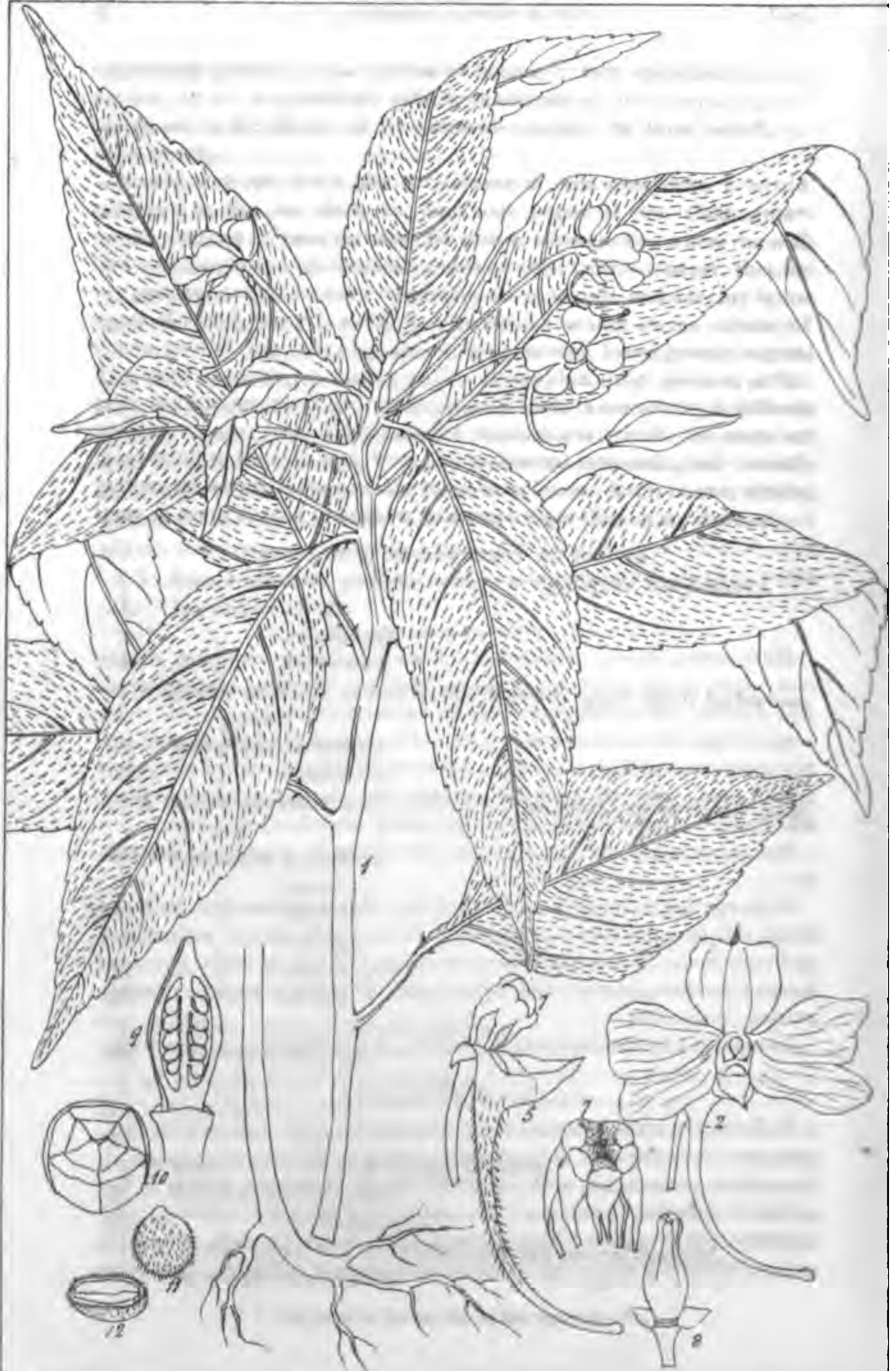
* Reprinted in the last No. of this Journal.—ED.



I. Dasysperma. R.W.

der, about twice the length of the petals, straight. *Petals*, smaller than the upper sepal, the upper lobe much smaller than the lower. *Capsule* oblong, attenuated at both ends, glabrous.

Hab. Shevagherry hills, in dense forests, at an elevation of about 4,500 feet.

This is a large, very ramous, bushy plant, from four to six feet high, the larger branches naked, but the young terminal shoots bearing numerous, closely congested, rather small leaves, the largest rarely exceeding 2 or 2½ inches long in its whole length; by ¾ broad. Sometimes the petiole has only one pair of glands, but oftener more, and the bristles of the lower serratures of the leaves are often glandular. The peduncles are usually three together, and about the length of the adjoining half. The flowers are conspicuous on account of the large upper very petaloid sepal, nearly equaling in size both the petals, and the much greater size of the upper than the lower lobes of the petals. It is nearly allied to I. *arcuata*, but is readily distinguished by being every where glabrous, in place of all more or less clothed with pubescence as in that species. It is distinguished from I. *Balsaminia* by its glabrous capsules, and from *Leschenaultii* by its glandular petioles, and aggregated pedicels.

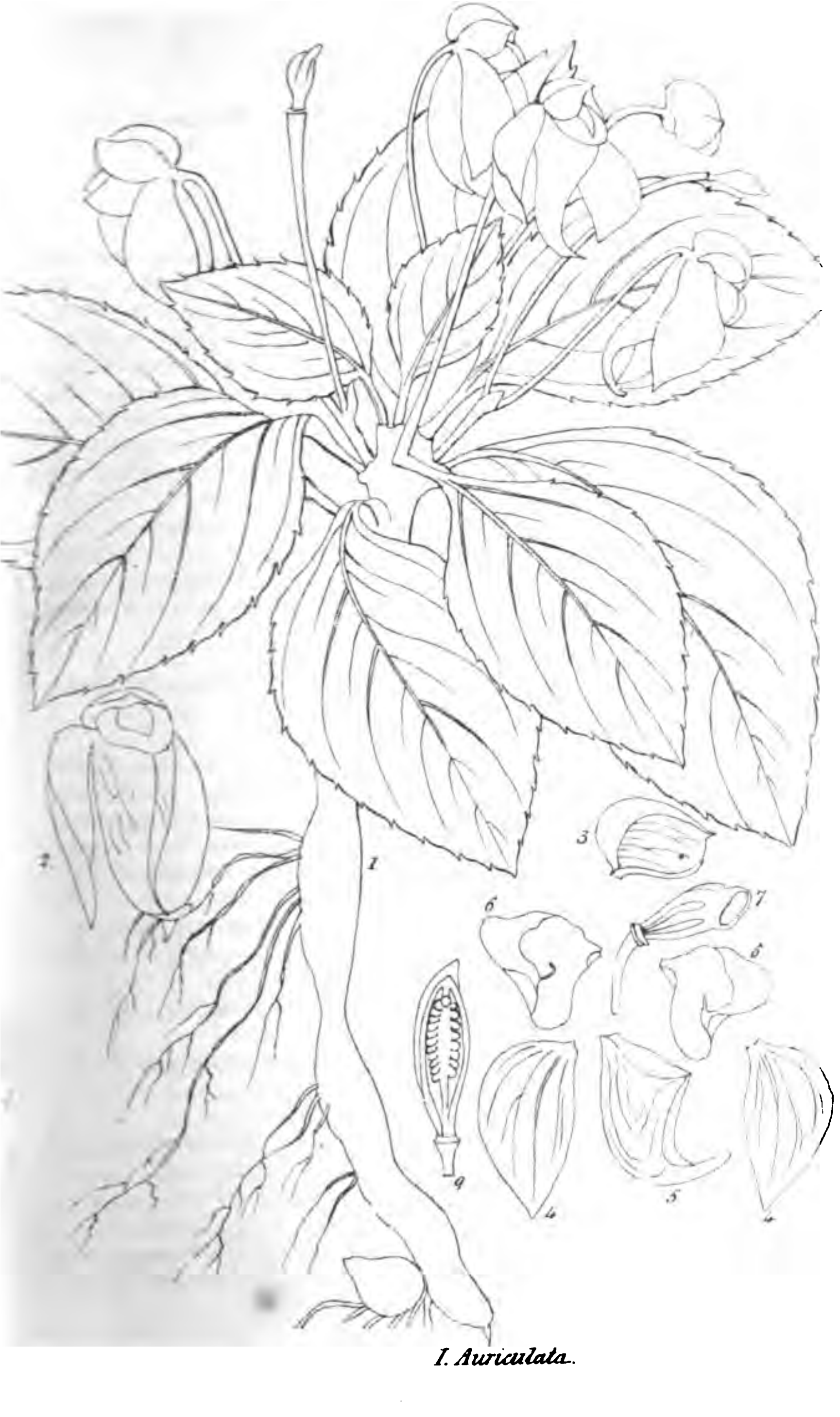
§ 2. *Leaves alternate, peduncles two flowered, upper sepals herbaceous (green).*

4.—IMPATIENS *auriculata.* (R. W.)

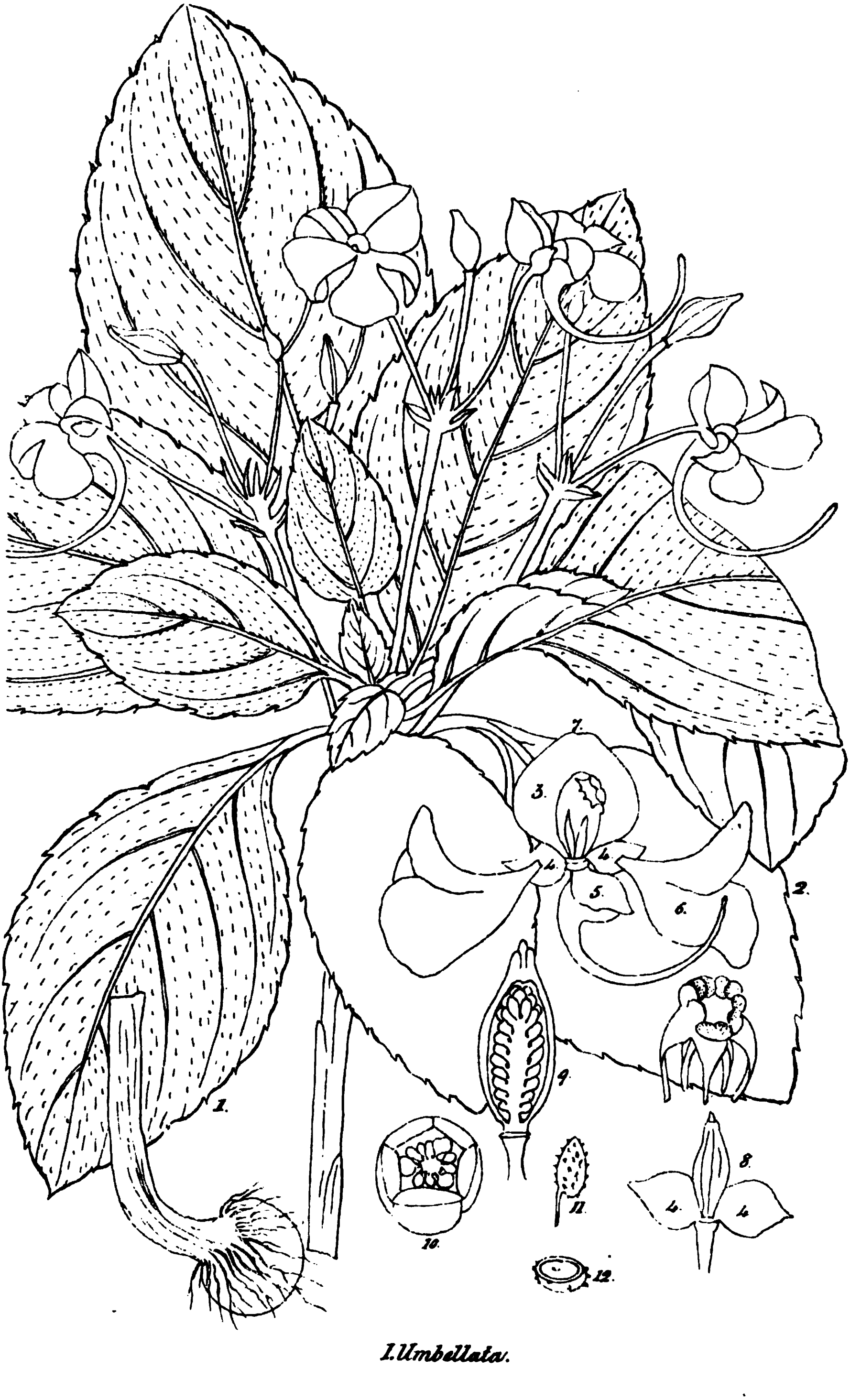
Herbaceous, procumbent, glabrous, rooting along the stem. *Leaves* congested on the ends of the shoots, petioled, alternate, broadly ovate, lanceolate, bristle serrated. *Peduncles* about the length of the petioles, two flowered. *Pedicels* erect, many times longer than the peduncle. *Flowers* large. *Sepals*, upper vaulted, crowned with a foliaceous crest; lateral ones very large, pendulous, obliquely ovate, acute; lower, conical, including the inferior half of the lower petals, and ending in a hooked spur. Upper lobes of the *petals* smaller, opposed to the superior dilated half of the lower. *Capsule* ovate, many seeded.

Hab. Courtallum on branches of trees, flowering in August and September.

This species differs so much in the general form of its flowers, and in the relative size of their parts, that I at first proposed separating it from the genus. The discovery of a second very nearly allied species, but agreeing better in these respects with the other members of the genus, renders such a step inadmissible. The specific name is in allusion to the side sepals hanging down on each side like dog's ears. The general appearance of the flower, from the mixture of colours which it presents, is very unusual. The upper sepal or helmet, which, it greatly resembles, both in form and situation, is bright green, the



I. Auriculata.



I. Umbellata.

lateral sepals and spur, deep scarlet, while the upper projecting portion of the petals is dark purple.

It grows on branches of trees, on the top of some hills, much exposed to rain and mists, in large tufts, covered with flowers, when I gathered it forming an object not less curious than beautiful. The distance and intricacy of the way to the station prevented my visiting it more than once, though rewarded with a very large collection of new plants, from having lost my way home, and being forced to spend the night as I best could in the jungles.

5. IMPATIENS *viridiflora.* (R. W.)

Herbaceous, erect, ramous. *Leaves* succulent, congested near the ends of the branches, petioled, ovate, lanceolate, acute, incurved bristle serrated, glabrous. *Peduncles* axillary, two, rarely one, flowered, longer than the petiol, and shorter than the pedicels, when two. *Sepals*, upper vaulted, and crowned with an erect, foliaceous crest; lateral ones subulate, reflexed. *Spur* conical, revolute at the point, twice the length of the thick fleshy petals. *Petals* unequally lobed, upper lobe concealed under the sepal. *Capsule* glabrous.

Hab. Shevagerry on the highest part of the hills, about four thousand five hundred feet of elevation, forming large masses on the branches of trees.

This differs from its congener, in the small size of its lateral sepals, somewhat in the position of its petals, in having all its sepals of a bright herbaceous green, and in its erect ramous tree like habit.

§ 3. *Leaves alternate, peduncles several flowered, upper sepals petaloid.*

6. IMPATIENS *umbellata.* (HEYNE.)

Herbaceous, erect, root tuberous. *Leaves* crowded towards the apex of the stem, broadly ovate, lanceolate, obtuse from crenated to incurved bristle serrated; above, sprinkled with short hairs, below, usually coloured glabrous. *Peduncles* shorter than the leaves, bearing 4-6 rather large pedicelled flowers. *Sepals*, upper orbicular, nearly equaling the petals, not furnished with a herbaceous point. *Spur* slender, tapering, curved upwards, longer than the petals: lobes of the *petals* about equal, lower one broader, cuniate. *Capsule* glabrous, many seeded; *seeds* echinate.

Hab. Courtallum, in moist soil in alpine jungles, at a considerable elevation.

As this plant has hitherto been described from dried specimens only, the accompanying figure may serve to make it better known. I have somewhat extended the character, which is the more necessary, now that so many species have recently been added, and are daily adding to the genus. The leaves are described as " usually coloured below ;" they are generally, but not invariably, tinged with a dark brownish purple on the under surface. I have as yet only met with this plant at Courtallum, which is probably Heyne's station, though not mentioned.

7. IMPATIENS *grandis. (Heyne, Wallich,* in *Roxb. Fl. Ind. (Ed. Wall.)* 2 p. 464. *Wight and Arnott Prodrom. Fl. Pen. Ind. Or.)*
Hab. Courtallum—Shevagerry, in moist woods.

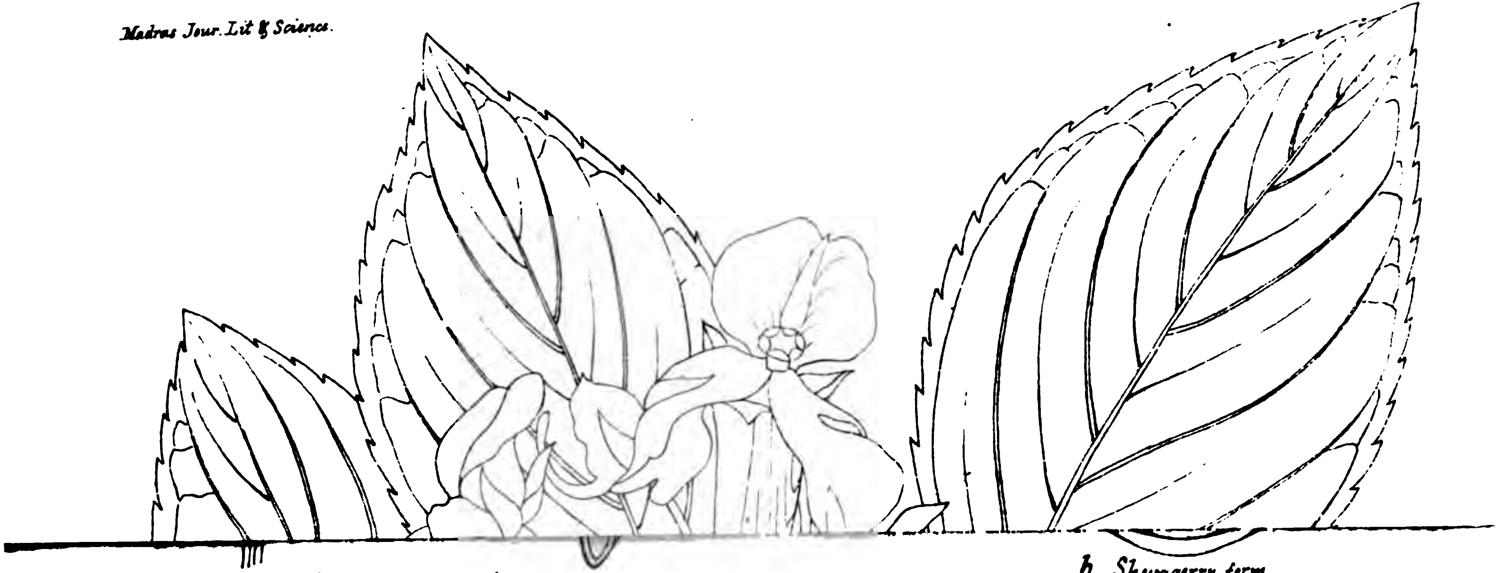
This magnificent species being as yet known to us through descriptions of dried specimens only, the accompanying figure, and following notes taken from growing plants will serve to make us better acquainted with it.

Erect, 4 to 8 feet high, much branched, herbaceous, except near the root, glabrous ; *branches* terate, marked with numerous prominent scars of fallen leaves. *Leaves* congested near the extremities of the branches, long petoiled, prominently veined, glabrous, ovate lanceolate, tapering downwards, till lost in the petiole, acute or prolonged into a short sharp pointed acumen, acutely incurved bristle serrated. *Petoiles* furnished near the apex with two pedicelled glands. *Peduncles* axillary, longer than the petoiles, erect, bearing 3-4 large, long pedicelled, pale rose coloured flowers. *Pedicels* nearly the length of the peduncle, with a single bractea at the base of each. Upper *sepals* large, emarginate, reflected ; under, funnel shaped with a tapering, conical *spur,* from 2 to 3 inches long, slightly curved towards the point. *Petals* about half the length of the spur, unequally lobed a little longer than the upper, very petaloid, sepal, and with it variegated with deep purple streaks and dots. *Capsule* glabrous, obsolately 5 angled. *Seeds* apparently glabrous, but were still unripe when the description was written.

As the Shevagerry plant differs somewhat in the form of the flower from the Courtallum one, I have added a representation of its flower to the figure. The differences are not material, but yet I think it well, to prevent future uncertainties, to show both forms. This part of the figure may not be found strictly correct, as it was made from a flower that had been dried and moistened again ; but, if at all incorrect, the error must be inconsiderable, as great care was taken in laying out the different parts.

8. IMPATIENS *cordata.* (R. W.)

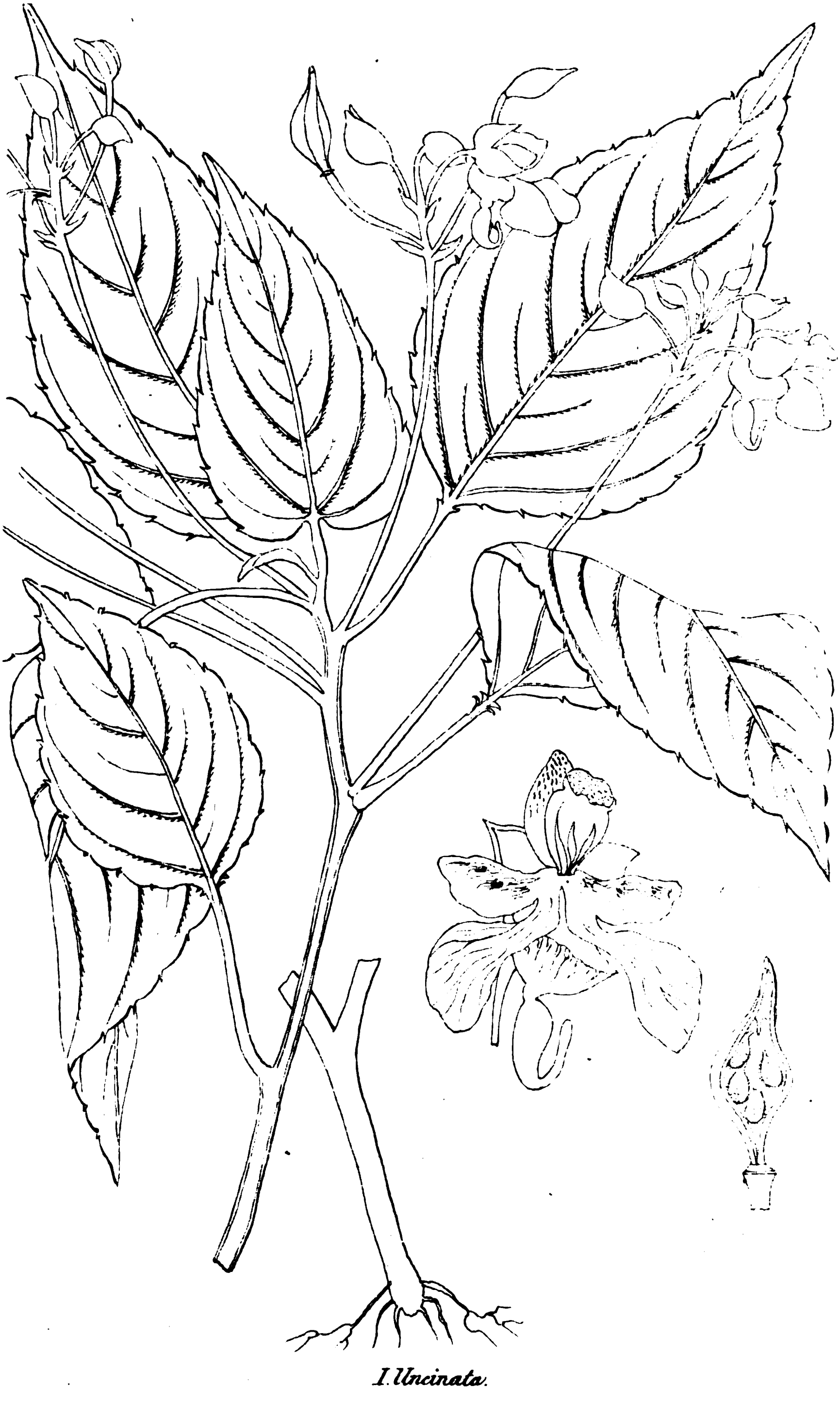
Herbaceous, erect, glabrous, except the veins on the upper surface of the leaves. *Leaves* alternate, cordate, ovate, acuminated, crenated ; above glabrous, except a few bristly hairs on the veins ; below glaucous. *Peduncles* axillary, 3—4 flowered, shorter than the leaves, lateral *sepals* large ovate pointed, a little shorter than the somewhat cuniate,



a. Courtallum plant.

b. Shevagerry form.

I. Grandis.



I. Uncinata.

emarginate upper one. *Spur* slender, much curved, longer than the petals. Lower lobes of the *petals*, very large, expanding; upper ones small, incurved, meeting in the centre and forming a vault over the column of fructification. *Capsule* ovate, glabrous.

Hab. Shevagerry, top of the hills; frequent.

This species seems allied to I. *umbellata* but is abundantly distinct. The large lateral sepals, a structure rare in the alternate leaved species, combined with the very unequal petal lobes, at once distinguish it from all the other peninsular species. The peculiar arrangement, and firm fleshy structure of the superior lobes of the petals, by which they completely conceal the column of fructification, forms another very distinct mark. The large lilac coloured flowers, contrasted with the darker purplish coloured centre, renders this a very beautiful species.

9. IMPATIENS *uncinata* (R. W.)

Herbaceous, erect. *Leaves* ovate, rarely cordate, acuminated bristle serrated, hairy on the veins above, glabrous beneath. *Petioles* rather long, glanduliferous at the apex. *Peduncles* axillary, solitary, nearly as long as the leaves, 4—8 flowered. Lateral *sepals*, about half the length of the upper one, ovate, pointed; lower, campanulate. *Spur* shorter than the flower, hooked at the point, contracted above, ventricose in the middle. Lower lobes of the *petals* declining, larger than the upper ones. *Capsule* attenuated below, beaked above, few seeded.

Hab. Courtallum—in moist alpine jungles; flowering in August and September.

A very distinct and handsome species, growing in thick shady jungles, on the tops of the hills moistened with frequent showers and almost constant mists.

10. IMPATIENS *campanulata*.

Herbaceous, erect, sparingly branched, glabrous. *Stem* and *branches* terete. *Leaves* alternate, long petioled, very broadly ovate lanceolate, shortly and abruptly acuminated, incurved bristle serrated; beneath glaucous, with the veins very prominent. *Peduncles* axillary, erect, longer than the adjoining petiole, 3 flowered. *Pedicels* about the length of the flower. Upper *sepal* keeled above, lower about equal, ventricose, with a small, short, incurved, spur; lateral ones, large; naviculate, about the length of the others. Upper lobes of the *petals* mucronate, shorter, the lower ones longer, than the upper sepals. *Capsule* ovate, attenuated at both ends, glabrous; *seeds* echinate.

Hab. Pulney hills, at an elevation of above 5,500 feet, in moist woods.

A rather large and handsome plant. The flowers large, cream-white, and speckled within with purple. The keel of the upper sepal greenish, ending in a mucronate point; the lateral ones, which are unusually large, very slightly falcate, the lower one speckled within like the petals. Anthers united and opening transversely across the apex.

Owing to the great size and incurving of the edges of the upper sepal over the upper lobes of the petals, they produce as a whole a campanulate form—hence the name.

11. IMPATIENS *viscida.* (R. W.)

Herbaceous, diffuse, rooting at the joints below, above erect; *stem* angled, a few bristly hairs scattered over it. *Leaves* alternate, longish petioled, ovate, somewhat acuminated, acutely serrated, veins on both sides, covered with stiff, erect, hairs. *Peduncles* axillary, 2—4 flowered, sometimes longer, but usually shorter than the adjoining leaf, erect, filiform, viscid. *Flowers* large; all the *sepals* about equal, the lower, furnished with a long tapering *spur*, nearly twice the length of the flower; lateral ones ovate, cordate. Upper lobes of the *petals* exceeding the sepals, 4 or 5 times shorter than the broad nearly semiorbicular lower ones. *Capsules* glabrous, tapering at both ends, ventricose. *Seeds* pendulous, hairy.

Hab. Pulney mountains, in wet swampy ground, at an elevation of about 5,500 feet. Flowers—large, pink.

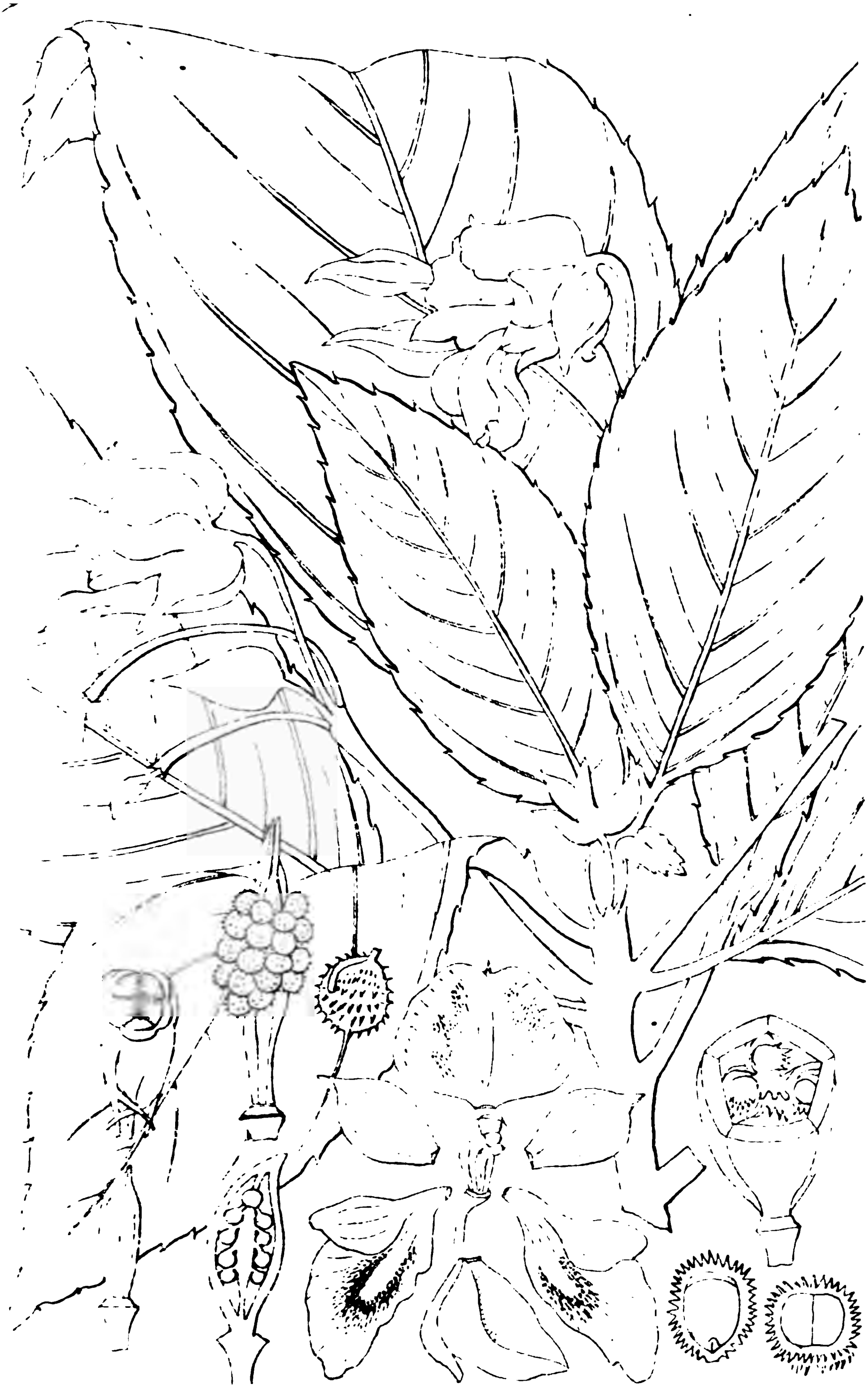
§ 4. *Leaves alternate, flowers racemose.*

12. IMPATIENS *maculata.* (R. W.)

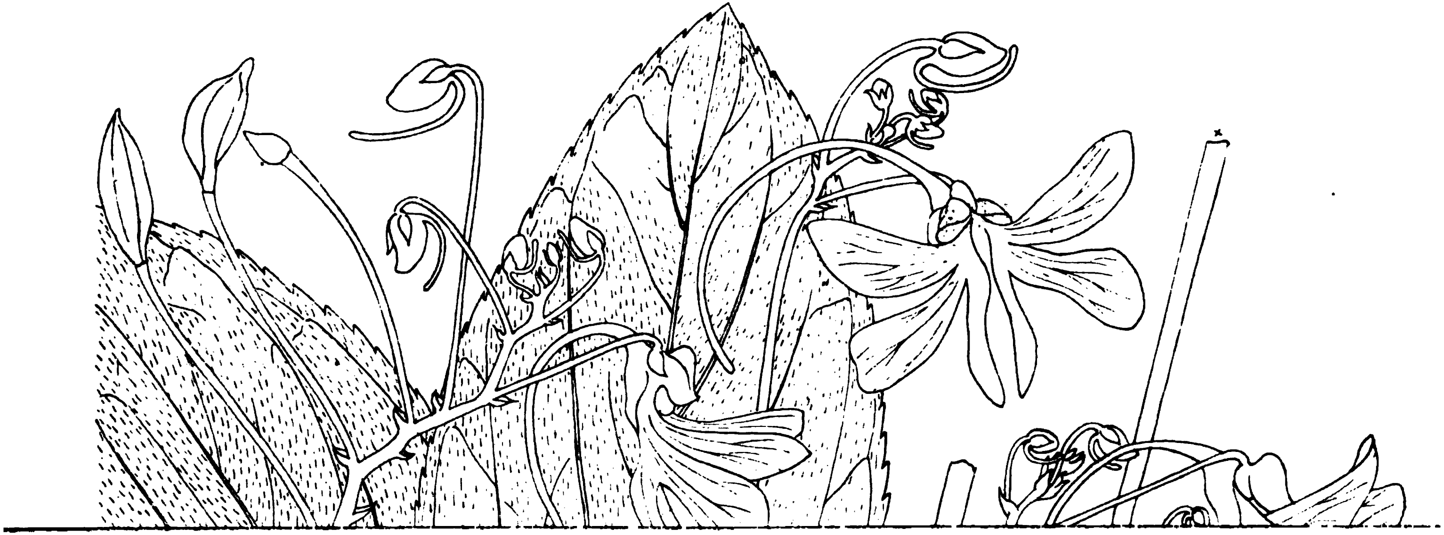
Herbaceous, erect, ramous. *Stem* and *branches* angled, speckled with brown spots, glabrous, except a few thinly scattered bristle-like hairs. *Leaves* longish petioled, glanduliferous, alternate, ovate lanceolate, acuminated, incurved, serrated, hairy on both sides. *Peduncles* axillary racemose, many flowered, longer than the leaves. *Pedicels* from the axiles of small subulate bracteas slender declining, pendulous in fruit. *Flowers* large. Upper *sepal* vaulted, obtuse, shorter than the ovate acute lateral ones. *Spur* slender, curved upwards, longer than the petals, *Petals* 2 lobed, lower lobe, very large suborbicular, upper one, most minute, concealed under the upper sepal. *Capsule* 5 angled, glabrous.

Hab. Shevagerry, on the banks of mountain streams; flowering in August.

A large and very handsome plant, some of those which I saw, having attained the height of nearly 6 feet. The racemes, are sometimes very long, nearly a foot; usually they are about the length of the leaves, but have not, then, attained their full growth. Many of the petioles, and occasionally some of the lower serratures of the leaves, have glandular bodies springing from them, spirally involute, like the junior



I. Campanulata.



I. Rivalis.

fronds of ferns: these I have not introduced into the character owing to their not being constant, though of frequent occurrence.

§ 5. *Leaves radical, scape racemose.*

13. IMPATIENS *modesta.* (R. W.)

Leaves few, radical, broadly cordate, ovate or suborbicular, hairy above, glabrous, and pale shining glaucous beneath. *Scape* erect, racemose, many flowered; *flowers* small, rather long pedicelled, from the axil of a small subulate bractea. Upper *sepal*, broad, obovate; the lateral ones, subulate, incumbent on the upper; lower, shorter than the petals, with a short straight, obtuse *spur*. *Petals* declining, 3 lobed, (lower petal 2 cleft, upper entire) hairy near the attachment. *Capsule*, glabrous, ovate.

Hab. Shevagerry on the highest part of the hills, in wet moss on the trunks of trees and large stones; flowering in August.

This beautiful and modestly retiring species, I found in great abundance in the thickest jungles, quite covering the stems of trees and stones, covered with moss. The colour of the flowers is pale pink, but owing to the dark ground against which it grows and the quantities congregated together, becomes very conspicuous. The whole height of the plants rarely exceeds from 8 to 12 inches, and the leaves from an inch and half to two inches in their longest diameter; the number of flowers varies from about 10 to 20 or more. They have an unusual appearance, from the approximation and downward direction of the petals, causing them, till closely examined, to resemble a single petal, simulating in a remarkable manner, the flowers and lip of some of the *Orchideæ.*

14. IMPATIENS *rivalis.* (R. W.)

Herbaceous; root tuberous. *Leaves* all radical, ovate oblong, somewhat oblique at the base, with remote, incurved bristle serratures, hairy above, glabrous, pale shining green below. *Scape* racemose, many flowered. Flowers large, pedicelled, from the axils of small pointed fleshy bracteas. Upper *sepal* obtuse, gibbous above, forming an arch over the column; lateral ones minute; lower, large ovate, ending in a slender, tapering, *spur*, nearly twice the length of the petals. *Petals* large, spreading, the lower lobe two cleft. *Capsule*, erect, glabrous, many seeded; *seeds* hispid.

Hab. Courtallum, in clefts of rock in streams, where exposed to the spray of water dashing around them.

This very beautiful species is found growing in clumps, and producing abundance of large pale pink flowers. I first met with it on the rocks, at what is called 'Five Falls,' in a situation almost inaccessible, and afterwards further up the same stream, in similar but more accessible places.

At the date of the publication of my *Prodromus*, only one species of this unusual form was known, the I. *Scapiflora:* since then, I have seen three or four more, namely, the two here described, and one or two, I am uncertain which, in Ceylon.

§ 6. *Leaves opposite, pedicels one flowered.*

15. IMPATIENS *fasciculata ?*

Herbaceous, erect, sparingly ramous at the base, glabrous, except the upper surface of the leaves, which is hispid. *Leaves* opposite, linear or lanceolate subsessile, cordate at the base, acutely subspinous, serrated, with two short, reflexed, subulate, interpetiolar stipule-like glands. *Pedicels*, one or two from each axil, shorter than the leaves, erect in flower, afterwards deflexed, pendulous. Flowers large; upper *sepal* broad cordate, keeled, retuse, mucronate; lower infundibuliform, scarcely half the length of the long linear, curved, slightly bifid, *spur*. Upper lobes of the *petals* triangular, pointed, about half the length of the upper sepal, and considerably shorter than the linear, acute, slightly falcate, lateral ones; lower lobes semiorbicular, notched at the point, 3-4 times larger than the upper sepal, but shorter than the spur. *Capsule* oblong, slightly ventricose.

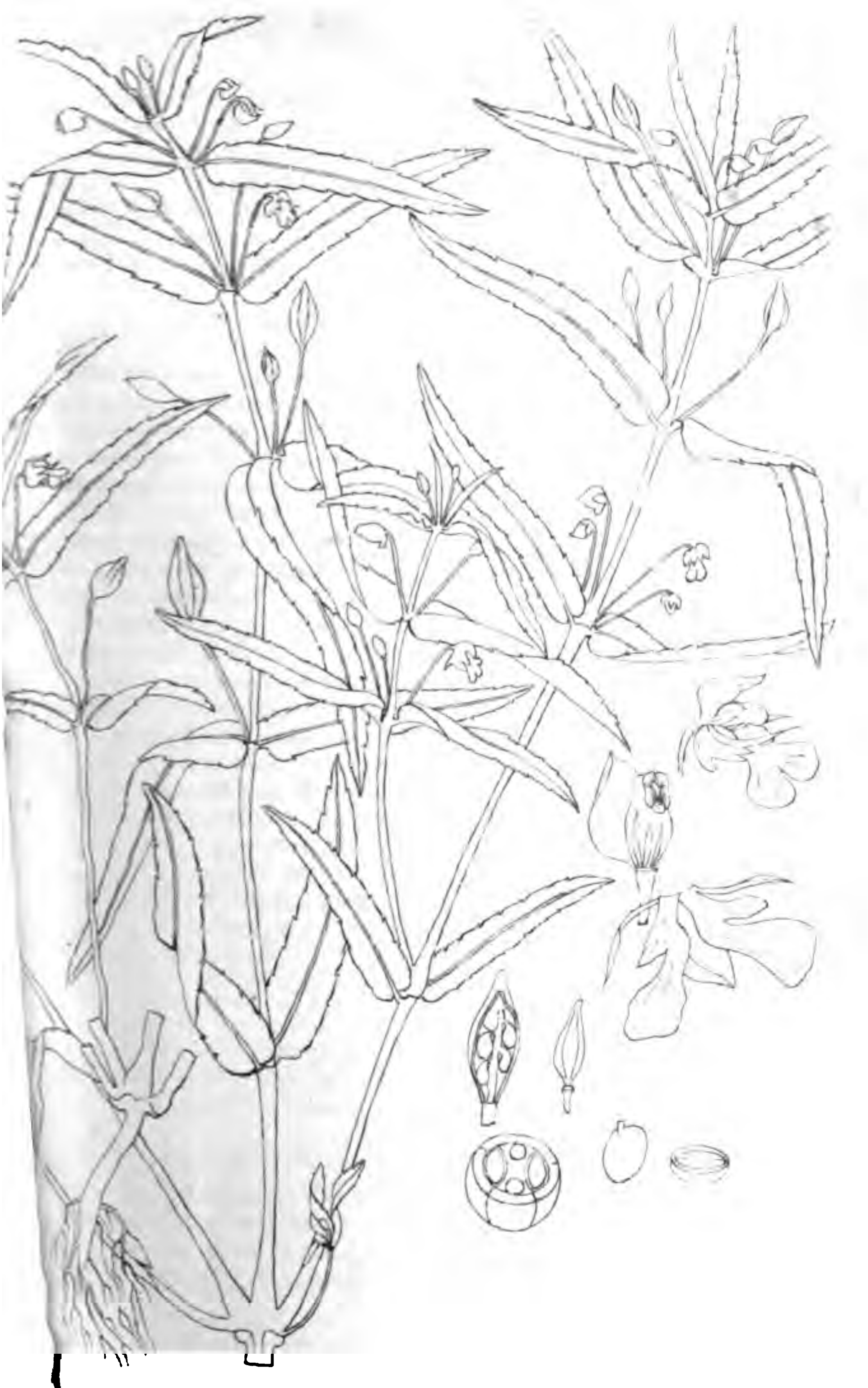
This plant certainly differs in some respects from I. *fasciculata* as now characterized, but not enough, it appears to me, to admit of my drawing up a separate character for it, the principal points of distinction being in this having two interpetiolar glands, resembling stipules, in the serratures of the leaves, being spinous, and in the lower lobe of the petals being three or four times larger than the upper sepal, in place of only twice, the size according to the character.

There is yet another source of doubt as to their identity, the one grows on the plains of Malabar, the other on the elevated marshes of the Pulney mountains, nearly 6,000 feet above the sea. If new I would propose the name I. *pungens* in allusion to the spinous teeth of the leaves.

16. IMPATIENS *rosmarinifolia ?* (RETZ.)

" *Pedicels* solitary, shorter than the leaves, *leaves* opposite, linear: *spur* short, somewhat recurved at the apex."—*De Cand. Prod. Syst. Veget.* I. *p.* 636.

I have adopted Retz's specific name for this plant with a doubt, which however, I believe unnecessary, as the only difference between the plant here figured and the above character translated from Decandolle's *Prodromus*, is in the number of pedicels in that being solitary, in this solitary or paired, in my opinion a distinction of no importance. This species appears exactly intermediate between I. *filiformis* and I. *tenella;*



Rosmarinifolia.

differing from the former in having a spur, and from the latter in the spur being almost rudimentary and curved outwards, in place of as long as the flower, and straight. These differences are perhaps too slight, and might, in a considerable number of specimens, be found to pass into one another, in such a way, as to admit of all three being united under one name, but for the present, I do not feel warranted in making the attempt.

§ 7. *Leaves opposite or verticelled, pedicels several flowered.*

17. IMPATIENS *verticellata.* (R. W.)

Herbaceous, diffuse, glabrous. *Leaves* verticelled, long, narrow, lanceolate, remotely bristle-serrated. *Peduncles* shorter than the leaves, axillary, solitary, erect, 2—3 flowered. *Pedicels* about half the length of the peduncle. *Flowers* large. Upper *sepal,* oblong, erect, somewhat cuniate at the base; lateral ones, about half its length, subulate, reflexed. *Spur* slender, tapering, curved, much longer than the petals. *Petals,* oblong, lax, longer than the upper sepal, deeply 2 lobed, lower lobe much longer than the upper. *Capsule* oblong, obtusely 5 angled, slightly drooping.

Hab. Shevagerry, in the gravelly beds of mountain streams ; flowering in August.

This beautiful species forms large clumps or beds, growing in the stiller parts of mountain streams, where gravel can collect, and is one of the most conspicuous and lively looking of the genus, from its large, deep crimson flowers, contrasting so strongly, with the dark green of its foliage. The whole plant is glabrous, the stems diffuse and jointed, each joint bearing a whorl of 4—6 narrow lanceolate leaves 4—6 inches long and scarcely ever one broad, much attenuated at both ends, paler beneath, and furnished, contrary to the usual character of the order, with subulate stipules; peduncles erect, about 2 inches long, bearing 2—3 pedicelled flowers ; pedicels about half the length of the peduncles, filiform.

II.—*Clavis Analytica of the* CONVOLVULACEÆ *of the Peninsula of India.—By* G. WALKER-ARNOTT, Esq. A. M., F. L. S. and R. S. EDIN. *Communicated, with Observations and Figures, by* DR. WIGHT.

TO THE EDITOR OF THE MADRAS JOURNAL OF LITERATURE AND SCIENCE,

SIR,—The subjoined *Clavis Analytica* of the Peninsular *Convolvulaceæ* (prepared and communicated to me by G. Walker-Arnott, Esq.) I hope may prove as useful to your botanical readers as I have found it, in determining the species of that beautiful, but difficult, and hitherto ill-understood, family of plants. In publishing it, I fear I am taking an undue liberty with my friend's manuscript, which he merely intended for my own use, as will appear from the following extract of his letter, but a fellow-feeling for all who have encountered the disheartening uncertainty attending attempts to unravel the species of this order, induce me to incur the risk of his displeasure, rather than deprive them of so valuable an aid. I may here premise, that I have met with one or two errors in the first two genera, two or three species of *Rivea* being referred to *Argyreia*, which, however, is of little consequence, as the precision of the generic characters, will soon lead to their correction. It is proper to add, that these are not chargeable to Mr. Arnott, he having simply reduced to a tabular form the species according to M. Choisy's determination, adding a few new ones in my collection, not seen by that gentleman when elaborating his memoir.

"As M. Choisy's memoir on the Indian *Convolvulaceæ* is inaccessible, (being printed in a foreign Society's transactions) I have got a loan of it from our friend Sir W. J. Hooker, and as *Convolvulaceæ* appears to be a favourite Order of yours, I shall here present you with a Clavis Analytica, adapted solely to the peninsular species, which I have made out from his specific characters for my own use. You of course understand, that in the Clavis I reject all characters (good or bad) that are not essential to your making out the plant: it is possible therefore, that ere this you may have got some new ones, in which case they, by the Clavis, may appear to coincide with what they are really distinct from."

The letters appended to the accompanying figures, show the successive steps of the operation of examining a plant, that at end of first step, refers to the second, the second to the third, &c. The species *Ipomea obscura* has been selected as a favourable example from its going through so many successive steps. These when put together form a very complete character : thus —" *a* stems twining—*g* capsules and sepals moderate sized or small—*m* flowers not capitate—*p* leaves cordate—*q* leaves entire—*r* flowers two or three—*u* one to three flowered—*v* leaves cordate acuminated, stems glabrous or softly villous. I. *obscura*."

As it appears not improbable that there are some additional genera, as well as species, not included in this Clavis, natives of the peninsula, I send along with it M. Choisy's own *Conspectus Generum*, published in the *Annales des Sciences Naturelles*, for September 1834, and leave you to determine on the propriety of reprinting it among your selections.

I remain, &c.

ROBERT WIGHT.

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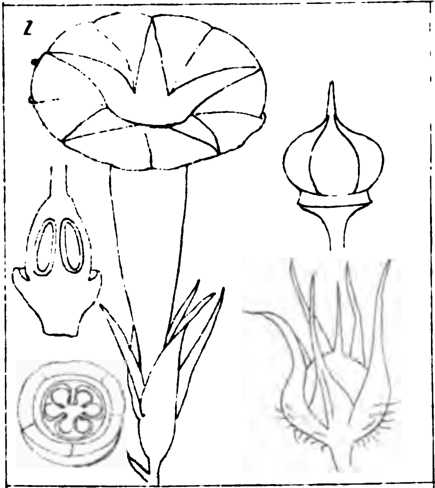

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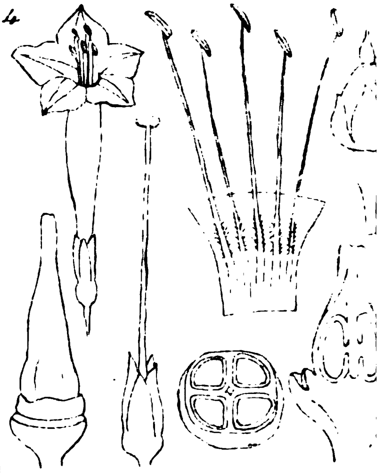

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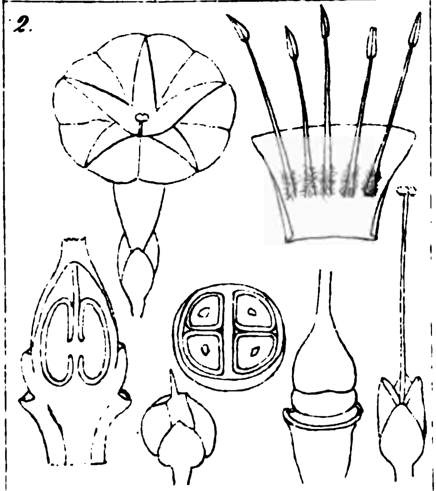

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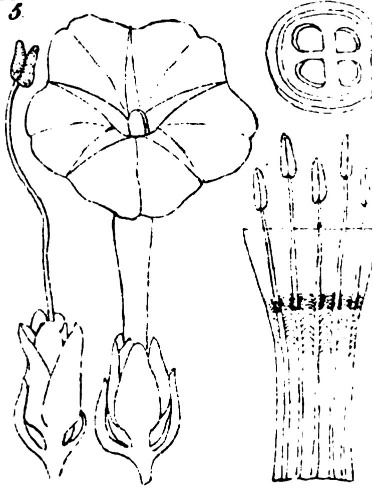

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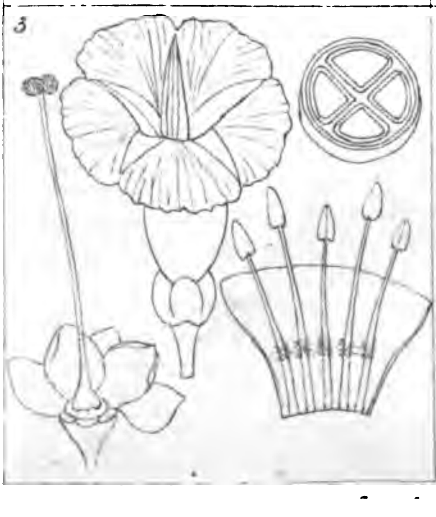

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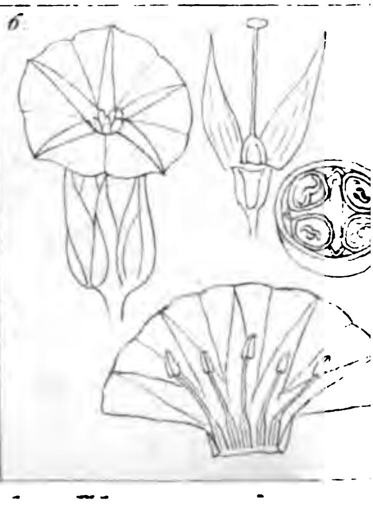

CONVOLVULACEÆ.

Clavis of the Genera.

	Embryo, without cotyledons	15	Cuscuta.
	——— with cotyledons. A.		
A	Fruit, a dry berry. B.		
	——— capsular. C.		
B	Ovarium, 4 celled	1	Rivea.
	——— 2 celled	2	Argyreia.
C	Styles, single undivided. D.		
	——— single and bifid, or 2 styles. K.		
D	Ovarium, 4 celled. E.		
	——— 3 celled	5	Pharbitis.
	——— 2 celled. F		
	——— 1 celled. I.		
E	Corolla infundibuliform: stamens exserted	3	Quamoclit.
	——— campanulata: stamens included.	4	Batatas.
F	Stamens exserted, coroll. infundibuliform	6	Calonyction.
	——— included. G.		
G	Lobes of stigma, globose. H.		
	——— filiform or terete	8	Convolvulus.
H	Sepals, verticillate	7	Ipomæa.
	——— inserted, some lower down than others	9	Aniseia.
I	Lobes of stigma, flattened—ovate	*10	Hewittia (W&A).
	——— globose, sepals enlarged after flowering	11	Porana.
K	Styles 1. bifid: anthers included	12	Breweria.
	——— 2, L.		
L	Styles, undivided: stigmas globose, anthers exserted	13	Cressa.
	——— each bifid	14	Evolvulus.

Clavis of the Species.

1. Rivea. *Ch.*

	Corolla inflated, cylindrical	1 R. tiliæfolia, ch.
	——— with limb spreading. *a.*	
a	Corolla hypocraterif., tube equal, narrow, peduncles 1 flowered	2 R. hypocraterif, *Lett.*
	——— infundibulif., tube wider upwards, peduncles 3 flowered or with 2 lateral abortive ones	3 R. bona-nox.

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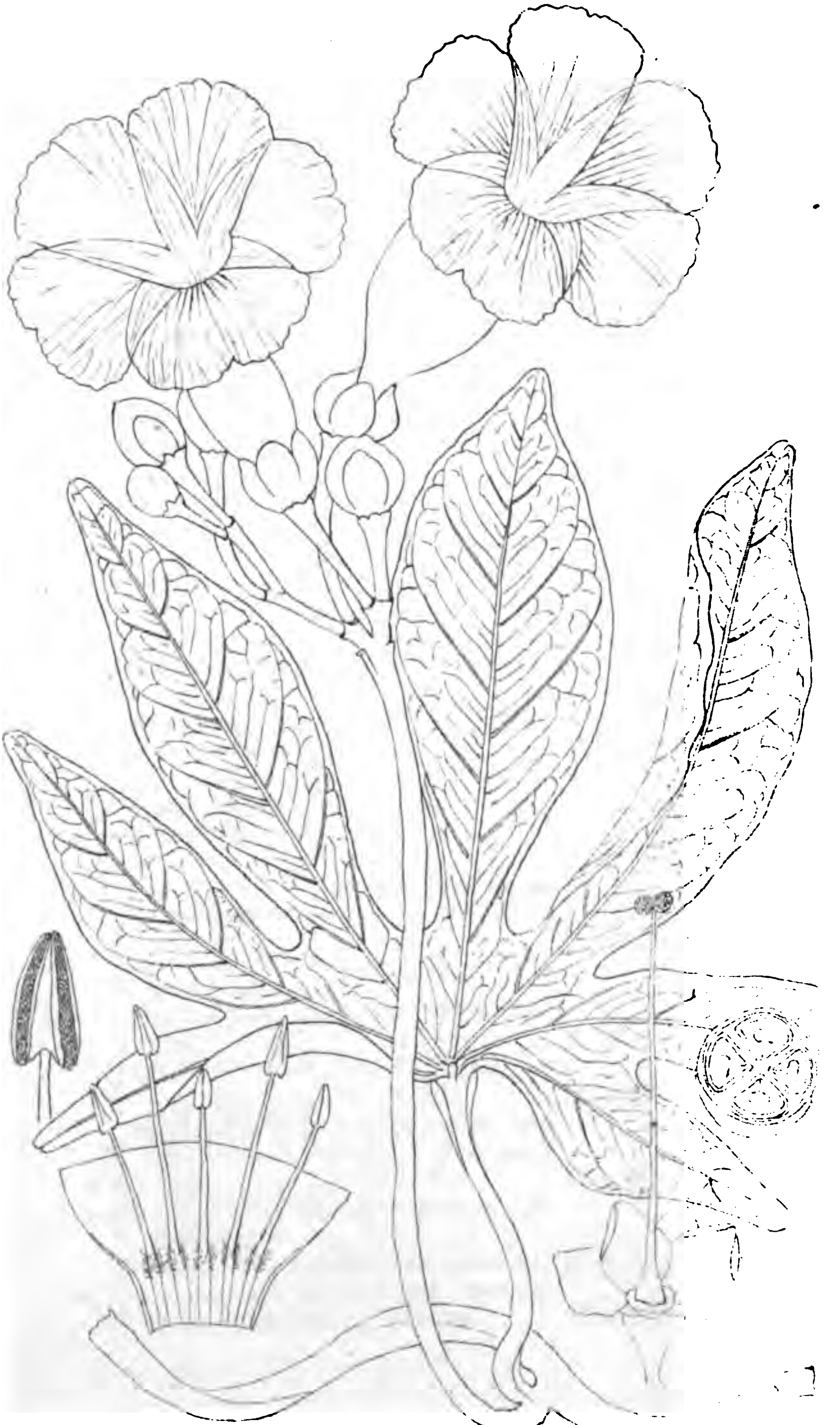
* 10 Shuteria *Ch.* (not W. & A.)

2. Argyreia. *Lour. Lettson. Roxb.*

	Stamens included. *a.*	
	—— protruded beyond the tube. *p.*	
a	Leaves tomentose, silky, or velvetty on the under side. *b.*	
	—— villous, or pubescent, glabrous or hairy on the under side. *h.*	
b	Leaves cordate at the base. *c.*	
	—— elliptical, oblong, or lanceolate. *e.*	
c	Leaves softly tomentose and silky underneath; flowers somewhat umbelled. *d.*	
	—— harshly tomentose, underneath; flowers cymose, stems hairy..............	4 A. hirsuta (W & A.)
d	Stems tomentose: bracteas oval, acuminated waved..........................	5 A. speciosa.
	—— pubescent or glabrous; bracts lanceolate or linear....................	6 A. argentea.
e	Leaves glabrous on upper side. *f.*	
	—— clothed on upper side. *g.*	
f	Leaves roundish oblong, acute..............	7 A. bracteata, Ch.
	—— lanceolate acuminated..............	8 A. fulgens, Ch.
g	Leaves subacute, upper side strigosely hirsute, under serices tomentose..........	9 A. Leschenaultii, Ch.
	—— obtuse, both sides velvetty........	10 A. pomacea, Ch.
h	Leaves cordate at the base. *i.*	
	—— not cordate. *o.*	
i	Stem harshly hairy. *k.*	
	—— glabrous, or pubescent or villous. *m.*	
k	Flowers capitate, capitulum surrounded by bracteas....................................	11 A. capitata.
	—— umbelliform, bracteas all mingled with the flowers. *l.*	
l	Hairs reddish; sepals ovate, elliptical obtuse................................	12 A. Neelgherryana.
	Leaves underneath livid or glaucous, sepals linear lanceolate pointed..........	13 A. pilosa (W. & A).
m	Exterior sepals equal to, or smaller than the others: leaves with a short broad sinus....................................	14 A. papulifolia, Ch.
	—— —— the largest and with margins revolute. *n.*	
n	Stem and leaves villous or softly pubescent	15 A. Roxburghii.
	—— —— sprinkled with short adpressed pubescence, or glabrous........	16 A. Malabarica.



Batatis Paniculata.

o { Leaves obovate-cuneate, emarginate; peduncle 3-6 flowered.................... 17 A. cuneata.
—— elliptical ovate or obovate; panicle lax corymbose.................... 18 A. elliptica.

p { Flowers capitate, leaves tomentose underneath.............................. 19 A. aggregata.
—— corymbose or cymose. *q.*

q { Stem and underside of leaves hirsute or strigose with adpressed hairs; peduncles a little longer than the petiole......... 20 A. setosa.
—— and leaves more or less pubescent; peduncles the length of the leaves...... 21 A. cymosa.

3. Quamoclit. *Ch.*

Leaves entire, or angled, or 3 lobed...... 22 Q. phœnicea.
—— pinnately cut..................... 23 Q. vulgaris.

4. Batatas. *Rumph.* and *Choisy.*

Leaves entire, angled or cleft—*a.*
—— quinate : stem twining, hirsute.. 24 B. pentaphylla.

s { Sepals ovate lanceolate, a little unequal : stems usually prostrate; peduncles few flowered............................ 25 B. edulis.
—— roundish, ovate, equal : stem twining glabrous : peduncles many flowered... 26 B. paniculata.

5. Pharbitis. *Ch.*

Leaves entire; pedicels longer than the bracts, nearly as long as the sepals.... 27 P. hispida
—— 3 lobed or entire, pedicels usually shorter than the bracts, about ½ of the length of the sepals.................. 28 P. nil.

6. Calonyction. *Ch.*

Sepals equal, with an awl-like point; flowers, large, white...................... 29 C. speciosum.
———— —— flowers smaller, purplish 30 C. speciosum.
—— unequal, obtuse, or with a very short point.......................... 31 C. asperum.

7. Ipomæa. *Linn.*

Stems not twining—*a.*
—— twining—*g.* (§ Strophipomœa.)

a { Stems creeping, and throwing out roots —*b*. (§ Erpipomœa.)
—— prostrate, not creeping—*f*. (§ Orthipomœa) leaves auricled at base : plants glabrous.

b { Leaves sagittate lanceolate, acute........ 32 I. reptans.
—— obtuse or emarginate—*c*.

c { Glabrous ; sepals wrinkled : flowers pretty large—*d*.
more or less hirsute : sepals not wrinkled : flowers small—*e*.

d { Leaves emarginate or 2 lobed........... 33 I. pescapræ.
—— cordate reniform obtuse........... 34 I. rugosa.

e { Leaves reniform obtuse, sinuately toothed : sepals ovate rounded, ciliately torn..... 35 I. reniformis.
—— cordate, reniform obtuse or emarginate, entire : sepals linear lanceolate, hairy 36 I. venicifolia.

f { Leaves usually truncate or 3 toothed..... 37 I. tridentata.
—— linear or linear lanceolate.. ..... 38 I. filicaules.

g { Capsules and sepals large and showy—*h*.
———— moderate size or small—*m*.

h { Leaves cordate, entire or sinuate—*i*.
—— divided—*k*.

i { Stem angled or winged : sepals unequal, densely pubescent.................... 39 I. turpethum.
—— terete : sepals equal, glabrous...... 40 I. campanulata Ch.

k { Leaves palmately 7 partiti—*l*.
—— cordate, palmately 5 cleft or 5 angled 41 I. vitifolia.

l { Lobes of leaves quite entire.............. 42 I. tuberosa.
———— sinuately toothed or pinnatifid. 43 I. dissecta.

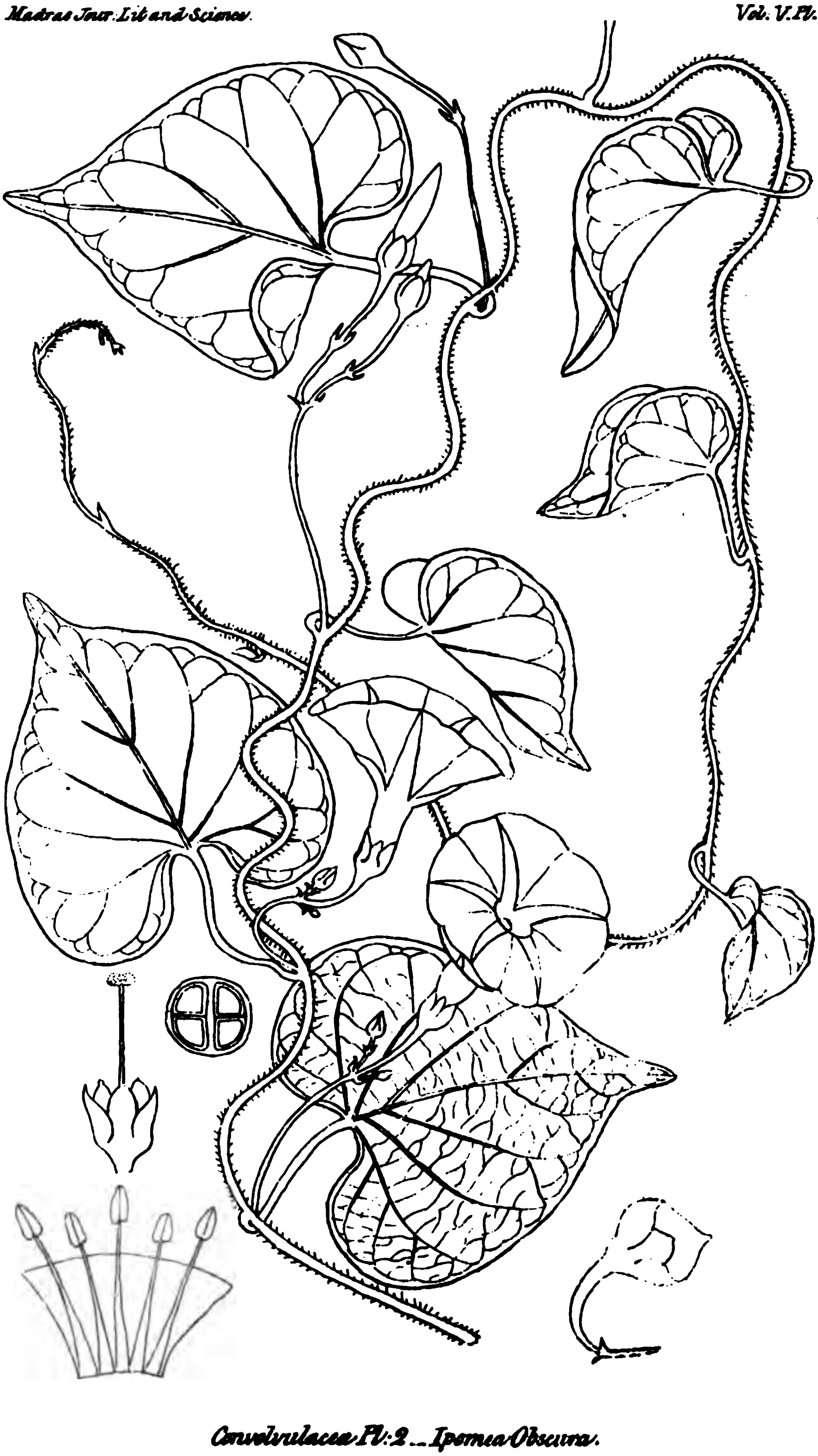
m { Flowers capitate or aggregated—*n*.
—— not capitate (in I. Wightii approximated)—*p*.

n { Leaves palmate or lobed, peduncles as long as the leaf.......................... 44 I. pestigrides.
—— cordate acuminated—*o*.

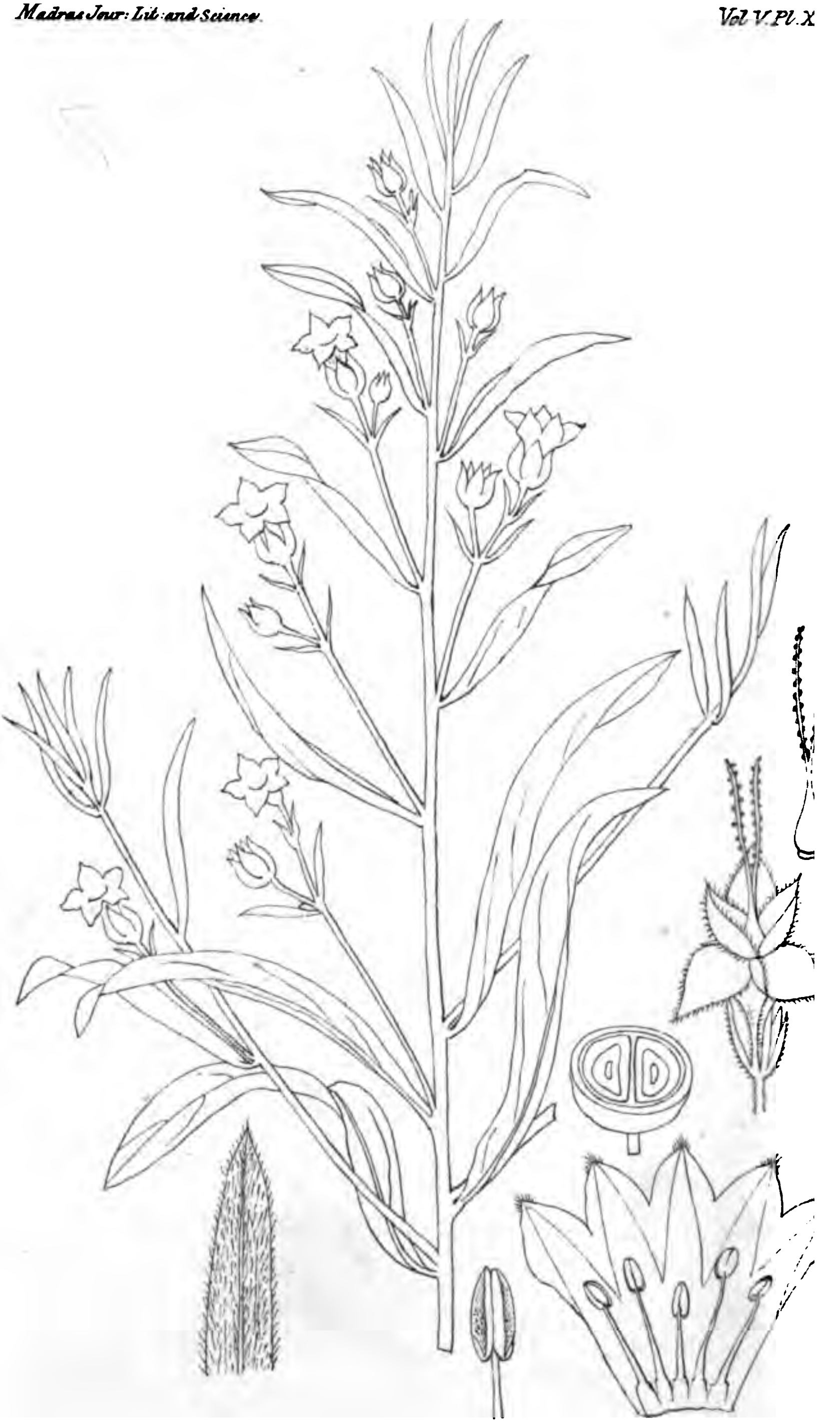
o { Peduncles a little shorter than the petiole : flowers inclosed in a perfoliate involucre 45 I. pileata.
—— very short : flowers not involucred. 46 I. cessiliflora, Roth.

p { Leaves cordate entirely or slightly lobed—*q*.
—— digitate or pedate—*y*.

q { Leaves entire—*r*.
—— toothed, lobed—*w*.



Convolvulaceæ Pl: 2 _ Ipomea Obscura.



Convolvulus Rottlerianus.

r Flowers cymose or panicled—*s*.
—— 2—3, or umbelliform—*u*.

s Flowers racemosely panicled, leaves ovate oblong acuminated, cordate, 3-6 inches long.................................... 47 I. staphylina.
—— cymose : peduncles shorter than the leaves—*t*.

t Leaves ovate lanceolate, a little obtuse mucronate (a doubtful plant)......... 48 I. caliginosa.
—— ovate, oblong, elongated, acute or acuminated.......................... 49 I. cymosa.

u Peduncles many flowered, stem usually sprinkled with hairs.................. 50 I. sepearia.
—— 1—3 flowered—*v*.

v Leaves cordate, acuminated : stem glabrous or softly villous...................... 51 I. obscura.
—— cordate lanceolate with a blunt point : whole plant glabrous........... 52 I. triantha.

w Flowers yellow ; style exserted ; leaves glabrous.............................. 53 I. chrysoides.
—— purple, style included : plant hairy : leaves tomentose underneath—*x*.

x Flowers cymose, distant, numerous...... 54 I. pilosa.
—— usually few on each peduncle, approximated................................ 55 I. Wightii.

y Segments of leaves serrated............. 56 I. coptica.
———— quite entire—*z*.

z Leaves tripartite, the segments trifid...... 57 I. dasysperma.
—— quinate—*&c*..........................

& Corolla infundibuliform ; seeds villous.... 58 I. pulchella.
—— campanulate : seeds glabrous...... 59 I. tuberculata.

8. CONVOLVULUS. *L.*

Stem erect ; peduncles longish........... 60 C. Rottlerianus, Ch.
—— twining—*a*.

a Peduncles few, 1 to 3 flowered—*b*.
—— umbellately many flowered...... 61 C. parviflorus.

b Leaves sagittate, somewhat auricled ; sepals obtuse.............................. 62 C. arvensis.
—— hastate cordate, sinuately toothed : sepals ovate acuminated.............. 63 C. refuscens, Ch.

9. ANISEIA. *Ch.*

Stem hairy, twining, leaves oblong cordate, acuminated, longish petioled.......... 64 A. calycina Ch.

Stem glabrous or nearly so, rooting, leaves oblong, linear or cuneate, very shortly petioled..............................	65 A. uniflora.

10. Hewittia. *W. & A. Shuteria Ch. (not W. & A.)*

1. H. bicolor W. & A. (C. bicolor Vahl. & C. bracteatus Vahl.)

11. Porana. *Burm.*

1. P. paniculata Roxb. (perhaps not indigenous).

12. Breweria. *R. Br.*

Stem twining, leaves cordate ovate, acuminated, softly villous, petioled, 2 inches long..................................	66 B. Roxburghii ch.
Stem erect: leaves from oblong lanceolate, to oval and obtuse, almost glabrous, subsessile, 1½-2 lines long.................	67 B.

13. Cressa. *L.*

1. C. indica Retz.

14. Evolvulus. *Linn.*

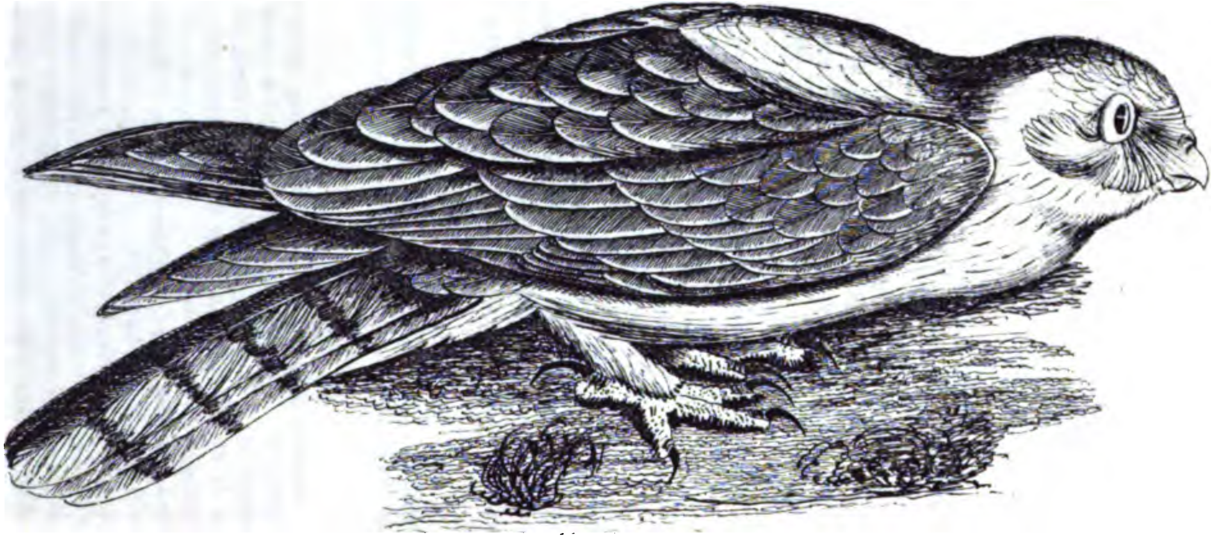
Leaves almost sessile, hirsute on both sides..	68 E. hirsutus L.
——— shortly petioled (various as to shape and hairiness)...........................	69 E. alsinoides L.

15. Cuscuta.

Flowers racemose, 5 cleft: style 1........	70 C. reflexa R.
Peduncles 3 flowered, flowers 4 cleft: styles 2.	71 C. hyalina R.

Synonyms.

1 Convol. gangeticus Roxb. 2 Letts. uniflora Roxb. 3 Letts. bona-nox Roxb. 5 L. nervosa R. 6 L. argentea R. 8 Convol. fulgens Wall. 10 Letts. pomacea. 11 Letts. strigosa R. 14 A. bracteata Wight in Comp. Bot. Mag. t. 3. 15 Ipom. multiflora R. 16 C. malabar. Linn. 19 Letts. aggregata. 20 L. setosa R. 21 L. cymosa R. 22 Ipom. phœnicea R. 23 Ip. Quamoclit L. 24 C. hirsutus Roxb. C. munitus Wall. 25 Con. Batatas L. 26 C. paniculata L. 27 C. purpureus L. 28 Ip. cœrulea and cœrulescens, Con. nil Linn. 29 Ip. bona-nox L. Ip. grandiflora Roxb. 30 Ip. muricata Linn. and Roxb. 31 C. asper. Wall. 32 Convol. repens Roxb. 33 Ip. pescaprœ C. bilobus R. 34 C. flagelliformis Roxb. 35 C. renif. Roxb. 36 C. hirsutus Wall. 38 C. medius R. not Linn. 40 not Linn. the Linn. plant is Rivea tiliœfolia. 41 C. vitifol. R. 43 I. diversifolia Ch. not Br. 46 C. sphœrocephalus R.



Ninox Nipalensis,
type of the
Genus Ninox (Hodg)

47 C. Kleinii Sp. 49 C. blandus R. and C. pentagonis R. 51 C. obscurus Willd. 52 perhaps a variety of Ip. cymosa. 53 C. dentatus R. C. flavus Willd. 54 C. pilosus R. 55 C. Wightii Wall. Pl. As. Rar. 57 C. pedetus Roxb. 58 C. digitatus R. 61 Retzio pilosi Rott. 62 C. Malcomi R. 64 Con. calycinus R. 65 C. uniflorus Burm. C. emarginatus Vahl. C. Rheedii Wall. 66 C. Semidigynus. 67 Ip. parviflora Rott. 68 E. sericius Wall. E. angustifolius R. 69 These two probably the same species.

EXPLANATION OF PLATES.

PLATE I.

Fig. 1. Pharbitis A. C. D. ovar. 3 celled.
„ 2. Ipomea A. C. D. F. G. H. sepals verticillate.
„ 3. Batatas A. C. D. E. corol. campanulate, stamens included.
„ 4. Quamoclit A. C. D. E. corol. infundibuliform, stamens exserted.
„ 5. Rivea A. B. ovar. 4 celled.
„ 6. Aniseia A. C. D. F. G. H. sepals inserted, some lower down than others.

PLATE II.

Ipomea obscura.—a. g. m. p. q. r. u. v. I. obscura.

III.—*Indication of a new Genus belonging to the Strigine Family, with Description of the New Species and Type.*—By BRIAN HOUGHTON HODGSON, Esq. British Resident in Nepal.

Family STRIGIDÆ.
Sub Family NOCTUINÆ.
Genus NINOX, *nobis (a Niso et Noctua).*
Type NINOX *Nipalensis, nobis.*

Character.—Bill, disc, conch, and feet as in *Noctua.*—General contour, with the character of the plumage, strictly falconidine. Wings long and firm, 3d quill longest, 1st and 2d moderately gradated; the primes, pretty strongly emarginated high up from the tips; their edges, entire or nearly so. Tail long, straight and even. *Type, Ninox Nipalensis, nobis. Habitat,* central region of Nepal. Habits, insectivorous and crepuscular.

The experienced *Shikaree* who brought me, recently, a fine male specimen of this bird, asked me, when he put it in my hands, whether it was a *Baáz* (hawk) or an *Ulu* (owl)? And the more I examined its graceful form, its unrelaxed plumage, its strong and ample wings and tail, and even its peculiar colouring, the greater reason did I perceive to admire the man's acuteness of observation. It is an owl, undoubtedly, but the most accipitrine of owls; and, much as the peculiar attributes of Noctua had prepared me to expect, in or near this group of the Strigidæ, the type and symbol of the Accipitrinæ, I did not hope that the forests of Nepal would so soon yield that type to my own hands.*

SPECIES new, *Nipalensis nobis.*

Form.—Bill to head as 1 to 1¼ inch, short, arched from the base, considerably compressed and feeble rather before the large cere; the tomiæ entire and very little trenchant; tip of lower mandible very obliquely and slightly truncated. Nares small, round, anteal, furnished with a central pillar, and partially free and apert; the cere behind them swollen semitubularly, and soft. Head very small and accipitrine, void of egrets, almost so of facial disc, and only strigine in the size and position of the eyes. Opening of the ears but $\frac{3}{16}$ of an inch long, nearly round, quite simple, and protected by a cross row of setaceous plumes. Tail equal to the body in length, composed of 12 firm and unbowed feathers, of nearly equal length, but tending to a rounded form at the end. Wings 1¼ inch less the tail; 3d quill decidedly longest; 1st but two inches, and 2d, only half an inch less the 3d; 1st to 4th inclusive sharply emarginated on the inner web, remotely from the tips; and 2d to 5th on the outer; all firm and nearly or quite void of strigine characteristics: tertiaries nearly two inches less the primaries: scapulars as much shorter again. Tarsi submedial, slender, moderately plumed. Toes rather long, cleft, void of plumes, covered by rigid hairs which become spinous laterally near the soles; lateral fores, equal; central, not elongated; hind, small; all cleft; soles of the fores, depressed, flat and papillose; of the hind, full. Talons long, slender, very acute, subequal; inner and central equal; outer fore, less; hind, least: inner process of the central one intire; fores, flat beneath—the hind, rounded. Plumage, generally, neither lax nor soft.

Colour and *size.*—Above, a medial earthy brown; beneath, sordid rusty from chin to breast, and white from breast downwards. Disc, towards the bill, hoary; towards the head, brown. Superior surface of the bird unmarked save on the tail, which has six, broad, regular bars equal to their paler intervals, and five of them apert: ground colour of the inferior surface, largely picked out with longitudinal central drops of brown, spreading as you descend the body, and changing into hearts on the flanks; tibiæ and tarsi sordid rufous, with vague cross bars of brown: vent and under tail coverts, pure white: lining of the wings, impure rufous, like the breast, and bimaculate barwise with brown: the quills internally on the inner webs, barred with pale pure rufous. Feet, bright yellow; bill and nails blackish blue horn; cere greenish; iris golden yellow. Intire length of the bird (male) twelve inches; of the tail, six; of the bill, one; of the tarsus, $1\frac{6}{16}$; of the central toe, $1\frac{3}{16}$; of its nail (straight) $\frac{5}{16}$; of a closed wing, 8¼. Weight 7oz. Expanse of wings, 27 inches. Intestinal canal 16 inches long, of medial subequal caliber. Two inches from anal end, two cæca, each of 2½ inches in length, and slender, with enlarged globose distad extremities. Stomach soft, large, spheroidal, distinctly solvent, but considerably thickened in the outer coat, and submuscular on the surface. Contents, large black beetles.

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* I regret I have no species of *Surnia* wherewith to compare our bird. *Surnia* may possibly dispute with it the honour of typifying the nobler races of the Falconidæ: but the thickly plumed toes and wedged tail of *Surnia*, sufficiently indicate that our bird is not of that genus.

Comparing our bird with Noctua, to which it has the closest affinity, it may be observed that the accipitrine tendencies of the genus are here much more apparent, particularly in the decreased size of the head, the greatly superior development of the wings and tail, and the greater firmness and still closer set of the whole plumage. The tarsi are rather lower, and the bill is more compressed before the cere, than in Noctua; nor have the wings the same technical formula. But these distinctions are trivial in comparison to the high development of the general falconidine (family of Diurnal Raptores) structure in our bird; and which structure is, as it were, latent in Noctua.

Noctua approaches the Diurnal Raptores by its firm plumage, and the very small development of the ear conch and of the disc, not to mention the absence of egrets, and the small head. Our genus can scarcely be separated from the sub-family of the Noctuinæ, which latter would appear to *include* the Surnianæ. Or, if the latter be allowed a sub-family distinctness, I know of no genera fit to be ranged under it, as the analogical equivalent of the Accipitrinæ and Falconinæ, save Surnia and our Ninox, the genus Surnium of authors being much more strigine than the type of the Noctuinæ. Our genus has wings less than the tail, but longer in proportion to it than Accipiter. It may be a question, therefore, whether Ninox symbols Accipiter or Falco. Our bird at ten paces, would pass for a Tinnunculus, with which it agrees very much in structure and in habits (insectivorous). *But*, in Tinnunculus there is a wide deviation from the type of Falco: and the truth would seem to be the Diurnal as well as Nocturnal Raptores require to be reclassified.

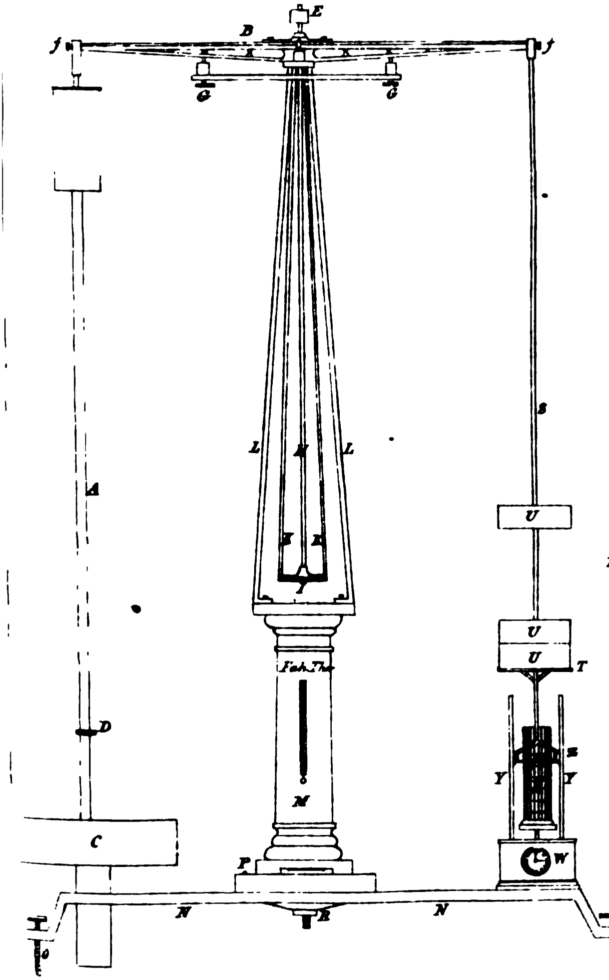
IV.—*Description of a Plan for a Self-Registering Barometer, and for the Construction of Metallic-tube Barometers.—By* WILLIAM GILCHRIST, Esq. *of the Madras Medical Establishment.*

A Barometer that will record constantly, and with scientific accuracy, the varying pressure of the atmosphere, is, so far as I know, a desideratum in the study of Meteorology. This important object may, I conceive, be accomplished by suspending a barometer tube from one end of a balance—an apparatus being connected with the other to record the oscillations occasioned by the varying weight of mercury in the tube, or, more correctly, the varying pressure of the atmosphere on the top of the tube, and of which the height of the mercury within is an exact measure.

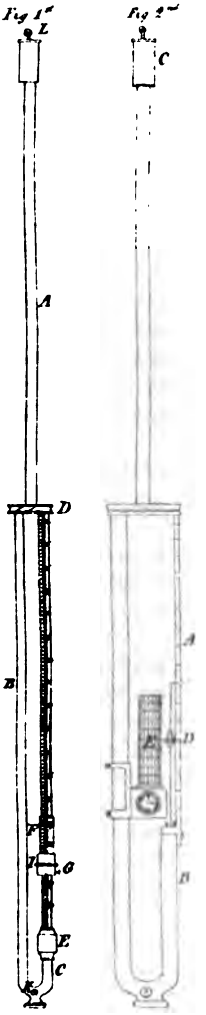
In principle the barometer is a balance of a very delicate kind, its function being to *weigh* a given column of the atmosphere, by counterpoising its weight with a column of mercury—like the balance, therefore, this instrument requires simplicity of construction, since a complicated structure would impede its free working, and, of consequence, falsify its indications. The nearer the principle of the balance, therefore, is approached in a barometer intended to register its own movements, the better is it adapted for the exact purposes of science. In the plan about to be described, this object will be found fully attained, since a balance is made the medium of register.

The accompanying is a sketch of the instrument (Pl. 15. fig. 1.)—A is a tube, suspended from one end of the balance B. The tube is of cast iron, cast in the shape required, thereby avoiding the tediousness of boring. The upper part, it will be observed, is considerably larger than the lower. I purpose making the interior of this part with a uniform area of two square inches. The evident object of this is to *gain power*, for the larger the area of the bore, the greater is the weight of mercury displaced or added, according to the depression or elevation of the column of mercury, and consequently the apparatus has a proportionally greater power to overcome resistance, which at most can be very small. A cubic inch of distilled mercury weighs 3.434 grains, which divide by 1000 = 3.434, so that an atmospherical alteration that would affect the barometer $\frac{1}{1000}$ of an inch gives nearly 3½ grains of power—two square inches of area, then, will give nearly a power of 7 grains to indicate the third decimal figure, and nearly 70 grains to indicate the second or $\frac{1}{100}$ of an inch; so that it is evident the above power is amply sufficient to overcome all obstacle, and to admit of recording variations of the mercurial column to $\frac{1}{1000}$ of an inch, a degree of minuteness amply sufficient to meet the most exact demands of science. The upper part of this tube must be bored accurately—as on the uniformity of caliber of this portion of the tube the correctness of the instrument essentially depends. This

Balance self Registering Barometer



Metallic tube Barometers



J. Gilchrist. Inv. et del.

point must be determined with the greatest nicety. C is the cistern, the broad upper part of which is 12 inches in diameter, while the lower is of such bore as to admit of the tube moving up and down without touching the sides of the former. The cistern consists of cast iron, and, when the apparatus is being conveyed, the screw D is screwed into the top, thereby preventing the escape of the mercury. The balance B is constructed on the usual principles; the weight E on the top adjusts the centre of gravity, while the screws F F, at the end of the beam, adjust the length of each arm; other screws, which cannot be shown, adjust the points of suspension to the plane of the point of support,* the screws G G support the balance when not in use—H is the index of the balance having a vernier at its lower end—I is a plummet, in the shape of an arc, the two radii K K which support it, turn on a pivot which is in the plane of the point of support of the balance—this plummet of course will always preserve the perpendicular: it is graduated into parts corresponding with the $\frac{1}{10}$th of an inch of elevation or depression of the mercury in the tube, so that, by means of this scale and the vernier on the index, the exact height of mercury at any time may be determined thereby—thus avoiding the necessity of disturbing the registering apparatus.

The inclined arms L L and the pillar M support the balance and its appendages. The stand N N is furnished with screws O O by way of feet, by which it is brought to the horizontal line, as indicated by spirit levels, one of which is seen in front of the bottom of the pillar. The end of another, at right angles to the former, is seen below P—the pillar is, by means of the screw and nut R below the stand, easily attached to, or removed from this.

The registering apparatus is seen attached to the right arm of the balance—S is a rod, on which at T is attached a disc of any metal, by way of scale pan; on this are placed weights U U U, which poise the the barometer at different elevations of places of observation. In the box W the clock work is contained, which turns the arbor on which the register cylinder X is fixed, after the manner of the cap of a watch. From the box W two rods Y Y rise up perpendicularly, which are guides to the pencil frame Z—(a) is the pencil which is on the principle of Mordan; it is acted on by a delicate spring which causes the point to press gently against the cylinder. This cylinder consists of ivory, the surface of which is made smooth but not polished—longitudinally are 24 lines—which are hour lines—being numbered 1, 2, 3, &c. on to 24. The horizontal lines correspond to $\frac{1}{20}$ of an inch of the barometrical tube at the other end of the balance. The middle horizontal line is called the zero line. By this I mean that when the instrument is put in action the pencil is said to touch this line, the balance having been previously poised by weights put in the scale pan. The height of the barometer, as indicated by one of common construction, is then noted, while the cylinder is revolving, the pencil will draw a line either above, on or below this zero line, according to the height of the mercury, at the time indicated by the hour lines. After completing one revolution the cylinder is removed and another replaced; it is then placed between two points and made to revolve, when being read off, against a vernier, so that variations to $\frac{1}{100}$ of an inch, as in the common barometer are distinctly seen. The register may be preserved either in figures or by diagrams, as represented in meteorological works.

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* See Mr. B[illegible]'s plans of the balance—*Madras Journal of Science*, No. 6.

That an apparatus, such as the one above described, will fulfil the purpose for which it is intended, there can be no doubt. The principle on which it is founded may easily be illustrated by immersing a common beer bottle in water until filled; it is then to be taken so far out as to leave only the mouth immediately below the surface, and then suspended by a string (previously so applied as will retain the bottom uppermost) from one end of a balance; counter weights are then put into the opposite scale pan, until the bottle is poised. If, now, air be blown up into the bottle by means of a tube, a portion of water will immediately descend, and the bottle end of the balance become as much lighter as the quantity of water displaced. If the above arrangement of apparatus be placed beneath the receiver of an air pump, and the air extracted from the latter, the water will descend without the necessity of blowing in air, and the weights, as in the former case, preponderate. It is a well known law that fluids, whether æriform or liquid, press equally in all directions. The pressure of the atmosphere rises and supports the column of mercury in the common barometer. It is evident, then, with reference to the law in question, that the *top* of the tube is pressed on with a force equal to the weight of mercury thus supported. So that if an air-tight plug (putting friction out of consideration) were adapted to the top of the tube, this would move downwards to fill the vacuum on the top of the mercury, with as much force as that by which the mercury begins to rise from below. Now as the weight of the mercury varies by the varying length of its column, in the exact same degree does the atmospheric pressure on the *top* of the tube vary. Suppose now a barometer tube, suspended from one end of a balance, its lower end immersed in mercury, to be exactly balanced by weights placed in an opposite scale pan.

Further, suppose the mercury in this tube to stand at 28 inches. Let now a variation of atmospherical pressure occur as will raise the mercury one inch. It is evident then that the tube is pressed down with a weight equal to this inch of mercury. The heavier end, that to which the barometer tube is attached, will therefore descend, occasioning a corresponding elevation of the other end of the balance, and of course of the pencil bearing on the register cylinder below.

The indications on the roller may be magnified several times by making the register arm of the balance longer than the other.

Metallic-tube Barometers.—The very great liability of the common barometer to derangement from the entrance of air, and the great danger of destroying the instrument in attempting to expel this by the only efficient mode—viz. boiling the mercury in the tube—has long been the bitter complaint of the scientific traveller and meteorologist. With reference to India, the truth of this remark is abundantly evident. I have met with very few who possess barometers, the uselessness of which, simply from air having entered the tube, did not occasion them to regret their distance from the instrument maker.

Various plans have been invented to prevent, as much as possible, this liability to the entrance of air; amongst which perhaps the best is the walking-stick barometer of Englefield: but all have the common disadvantage of glass tubes, and therefore are subject to be destroyed by fracture when the mercury is attempted to be boiled in them. I consider it practicable to substitute iron for glass, in so much of the barometer as it is necessary to expose to heat to expel air, and consider that the plan, represented by *fig.* 2, of the accompanying sketches, will fulfil that desirable object. A B C represents a tube of malleable iron, which is forged in a straight line, and bent as represented after a hole has been bored through it. The short limb C D consists of a common barometer glass tube, encased in one of brass, the intervening space being filled up with magnesian cement. The lower part of the glass tube passes through a disc of iron, which is convex below to apply exactly to the somewhat hollow expanded end of the metallic tube. On the side of this expanded end is a screw which fits a corresponding one inside of the lower end of the brass tube; by which means the two limbs are firmly connected; also being made to apply exactly, thereby preventing any escape of mercury. In order to ensure the exact adaptation of these two parts, the iron disc and expanded portion of the metallic tube are ground together before the latter is bent.

The part M, or the upper portion of the tube, has a diameter of one inch—the remaining portion is about ¼; less would do, but a smaller hole I fear could not be drilled so long. The advantage of having the top of the tube enlarged is twofold—1st, a much shorter portion is required to be ground accurate after boring—and 2dly, the indications in the glass or short limb are greater in the inverse proportion of that of the squares of the diameters of the two parts of the instrument.

It is essential that this enlarged portion of the tube be of uniform diameter or bore—this point must be ascertained before the top L be fixed on. The instrument is to be held perpendicularly, the stop cock K which cuts off the communication between the two limbs being closed, and the glass limb properly and tightly fixed on, mercury is poured into both limbs. Into the shorter as much mercury is introduced as will bring the top of it within the range of the scale. The longer one is to be filled within a line or two of the top. In this a float carrying a vernier is to be introduced, near the vernier a scale of inches and parts of an inch. This arrangement being made, the stop cock is turned so as to allow a certain quantity of mercury to flow from the longer into the shorter limb. The descent of the float in the former ought to have a certain proportion to the length of that in the shorter limb—the proportion as above stated being inversely as the square of the diameters.

If this proportion (which by means of the respective scales and verniers can easily be known, to $\frac{1}{500}$ of an inch) hold good, the upper part M is perfect as to bore. The lid L is now to be fastened on airtight—it is primarily, however, ground to fit exactly, and has a shoulder all round, corresponding to one on the top of the tube. Moreover it enters this a short way, the exact distance being marked outside by a line or dot.

The brass tube E D has a slit on opposite sides, and extending its whole length—the magnesian cement beneath being removed, the fluctuations of the mercury in the glass tube are seen. The usual scale of inches is affixed to this tube, either on a separate piece of brass, which can be moved to admit of adjustment, or engraved on the tube itself. The vernier G F can be moved up and down the tube, or fixed at any part, by means of the screw G, after which it can be brought to cut the height of the mercury exactly by means of the tangent screw L.

The instrument is now ready to be filled with mercury. The glass limb is first to be removed, then the plug of the stopcock K. Mercury is now poured into the long limb until this is half full, when the whole is placed in a sand bath and the mercury made to boil. When this is effected, more mercury is poured in until the long limb is filled, when the plug K is replaced—turned so as to prevent the escape of mercury, of which the short portion C is next filled and a small funnel, represented by the dotted lines, fixed on the aperture, so that the mouth will be uppermost when the long limb is placed lowermost in the sand bath to which the whole is conveyed, and the mercury boiled, K being previously opened. When cold, the stopcock is turned to cut off communication—the funnel removed, and the glass limb applied. Mercury

Fig. 4.

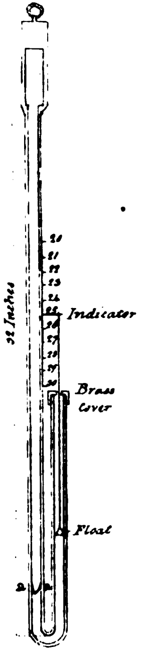


Fig 3.

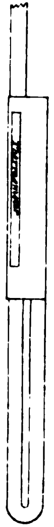


Fig. 2.

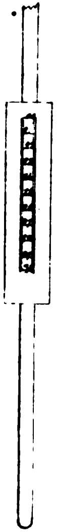
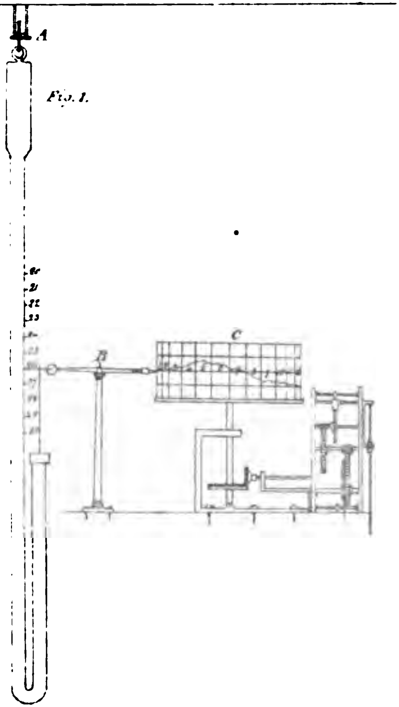


Fig. 1.



Scale of Inches

is now poured into this, to stand at the commencement of the scale, or 31 inches. The stopcock being opened puts the instrument in action.

The brass tube surrounding the glass one, forming the short limb, will be a great security to the latter. Nevertheless it would be an advantage to have one or two to apply in the event of accidents,

Fig. 3 is the above form of barometer converted into a self-registering one. The shape of the metallic tube, it will be observed, is the same as in the former one. In place of the glass or short limb, there are two rods A, only one of which is seen. The diameter of the upper portion of the long limb C is two inches—that of B half an inch. In this latter is a float, so constructed that the part immersed in the mercury is of the same specific gravity with that metal, while the part above the surface is as light as possible. The object of this is that when the barometrical column is falling, the light portion of the float will be pushed, as it were, before the mercury; while during descent the heavy portion will be carried along with that fluid. The pencil D is carried on the top of the rod being pressed gently against the register roller E, which, corresponding with X in the balance self-registering barometer, need not be again described. One of the pencil guides is graduated, and the pencil rod furnished with a vernier, so that, the height of the mercurial column being thus ascertained, the pencil is set at zero—as already explained.

V.—*Explanation of the Sketch of a New Indestructible Portable Mountain Barometer.—By* Captain George Underwood, *of the Madras Engineers.*

The tube represented in the sketch is intended to be precisely the same as the glass one used in Gay Lussac's, but constructed of iron, and of the dimensions attached. The projections below marked *a a*, indicate an inverted cone in the tube, to prevent air rising to the vacuum, and also to check the motion of the mercury while travelling. A thin rod of iron, with tight stoppers at each end, is inserted in the short tube while moving, and a brass cap fixed on the top effectually prevents the loss of any mercury. On the surface of the mercury in the short leg, floats a very light wafer of cork, to which is attached a straight upright wire, with an indicator at the upper end, moving along a scale, each division of which is equal to 4-5th of an inch, the cistern at the end of the long tube being four times the capacity of the short leg. The wire moves through a small hole in a brass cap, screwed on the upper end of the short tube, and which hole will also serve to give access to the atmosphere to exert its pressure on the mercurial column. It is evident that any fluctuations in the height of the columns of mercury will be immediately communicated to the indicator, either by the float being pushed up if the mercury rise in the short tube, or by its sinking down when it falls. The scale, it is unnecessary to observe, must be graduated downwards, and a properly marked vernier attached. To protect the indicator, scale and attached thermometer, &c. a thin cylinder of brass is fitted round the barometer, as explained in the sketch. Two vertical openings are cut in this, which when the brass cylinder is properly adjusted render the scale and thermometer visible; the indicating wire is thus preserved from wind and accident. The scale here marked allows for a range of ten inches, which is considered sufficient, being equivalent to a difference of level of more than 11,600 feet. For particular purposes, however, this may be easily extended. When packed for travelling, the float and its indicator can be nicely fitted into the brass cover before mentioned, and more than one of these should be kept for use. The diameter of the bore being half an inch, with a cistern at top of one-inch diameter, and three inches long, about five lbs. of mercury will be required to fill it, the weight of the iron tube, and other apparatus connected with this barometer, may probably be about 4½ lbs. more; thus the total weight will be under 10 lbs.

EXPLANATION OF THE FIGURES.

Fig. 1.—*Self-Registering Apparatus.*—A—is the screw for adjusting the height of the instrument relative to the clock work; by this it can be raised or lowered at pleasure.—B—a leveller nicely balanced on a knife-edge centre, with a circular ring at one end, to embrace the indicator of the float; at the other end is an ever pointed pencil on Mordan's principle, with a small spiral spring within, which keeps it continually pressed against the revolving barrel.—C—The revolving barrel which may carry covers of paper, ass' skin, ivory, &c. The vertical lines represent the hours and minutes; the horizontal lines are inches divided into the usual number of parts. A fresh cover is fixed on every 24 hours, by stopping the machinery and adjusting it to any particular moment, on attaining which by a watch the machinery is started.

Great wheel 120—Second wheel 120, pinion 10 – Pallet wheel 90, pinion 6—Motion wheels 30 and 60—Circumference of barrel 24 inches—one revolution in 24 hours.

Fig. 2.—Front view, shewing the brass cover intended to screen the indicating wire from the wind. This cover is moveable round the barometer, and the opening here discloses the scale, which can be easily read off. When travelling this brass cover is moved round so as to protect entirely the scale Thermometer and the wafer with its indicator.

Fig. 3.—Side view—The opening here in the brass cover (adjusted as above to disclose the scale) exposes the Thermometer attached to the Barometer.

Fig. 4.—Tube of thin iron about 1-8th of an inch thick, total length out and out 34 1-8th inches; the shaded part represents the column of mercury.

VI.—*Suggestions for a New Standard for Indian Weights and Measures.*

TO THE EDITOR OF THE MADRAS JOURNAL OF LITERATURE AND SCIENCE.

SIR,—As the attention of Government seems to be particularly directed to whatever may benefit commerce in India, it is probable that the important advantages likely to result from an assimilation of weights and measures, as well as of coinage, throughout this country, will not be disregarded much longer.

Before standards are fixed, no trouble should be spared in considering the subject in all its bearings; in order that the most convenient possible may be decided on. The more, therefore, it is discussed the better, and, though the following observations may contain nothing new, or the views expressed in them may be incorrect, they may be useful as likely to elicit more valuable remarks, and, on that account, worthy a place in your Journal.

I am, Sir, yours very obediently,

B.

The inconvenience which must follow a change, that may affect every purchase throughout the country, must necessarily be considerable. But, is not the present system, which obliges every merchant, every one who buys or sells, to change his calculation of weights and measures, whenever he changes his residence from one country to another, or, frequently, from one village to another, productive of as great, or even greater, inconvenience, than will be caused by the one change resulting from the Government adopting and enforcing a new standard? Will it not eventually become necessary to adopt one, when the trade of the country is in that flourishing condition, in which the rulers of the country, as well as most others, wish to see it? And is it not desirable, therefore, that it be introduced now, when with less commerce there will be less inconvenience? In England, within a very few years, the measures of liquids and grain have been assimilated; yet very little has been heard of the inconvenience, even in that commercial country; and the advantages of the new decimal system in France have, long ere this, compensated for the temporary disadvantages and inconvenience that attended its introduction.

The native unit of measure in the Tamul country is the grain of paddy in the husk—1,800 grains of this make one *álákoo*, or *olluck*, eight of which form a measure, *puddi*, *nári* or *seer*: the weight of this quantity of paddy being the unit of weight. Whatever difference there may be in the measures in use in different villages, this is the table of measure taught the children in Tamul schools with their alphabet; and, it is probable, was the universal one, when the country was under one Hindoo government, if it ever were so. The proportions of the measures vary but little, and although the *marcal* or *kooroonі* may be of different size, the *puddi*, or measure, at the same place is almost always the same aliquot part of it.

The standard of length in Malayalum is a small seed called in the language of that country *yevun;* but, excepting there, the English yard, foot and inch are in general use among the natives of this Presidency. The acre is completely introduced in the Salem district, and the Madras *cawny** is in general use in the measurement of rice fields in every district of the Presidency, notwithstanding the original land measures were as various as the weights or measures of grain. These alterations have taken place quietly and gradually, and show that similar changes may be effected without extreme inconvenience.

The pendulum is a standard of length not easily to be brought into common use in India; but the newly coined rupee is a measure of length and weight furnished and certified by government, easily applicable, constantly at hand—(although not in the abundance one might desire, yet generally sufficient for the verification of weights, &c.)—not liable to vary in dimension, and depending upon the accurate and absolutely unchangeable standards of measurement established in Europe. It is probable that this use of the coin may have been thought of, when its diameter was fixed at one tenth of a foot. It would have been more convenient, had it been made exactly, probably, one inch, and had the ends of the diameter been marked by larger dots in the milling; in which way the subdivisions of the inch into eighths or tenths might also have been shown.†

The pagoda and rupee have been occasionally referred to, in fixing the weights in use at Calcutta and Madras. I would propose the latter as the universal standard; changing not the names but the quantity of the measures and weights at present in use. In lieu of making the relation of the measures to weights depend upon paddy, I would have it depend upon water, as less variable and the principal change would be fixing the *pullum* weight universally at 3 rupees weight = 540 grains, instead of at 10 pagodas weight = 547 grains.

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* The Madras *cawny* is a more convenient measure than the English acre. It is an exact square of 240 feet sides; very nearly half a circle of 400 yards circumference, and since it contains 6,400 yards square, is divisible into 16 or 320 parts without remainder. The advantage of this is evident when it is considered that the Tamul fractions have always 320 its multiple or measure for denominator, and that the fractions in use among other natives of India are in like manner measures or multiples of 16. In this Presidency, too, the *cawny* is already more generally known.

† It is questionable, also, whether the gratuitous information contained in the words on the reverse "*one rupee*" and "*yek roopaec*" might not be advantageously replaced with something else.

Coins themselves might be made vehicles of useful information. Their relation to one another, and their weight and measurement, might all be stamped on them. I do not see why the English digits and alphabet might not be inscribed on the reverse of the copper and silver coin, &c. The moralist would be pleased to see knowledge and riches thus go together!

The following table shews the alteration that this would effect in the Maund *and* Candy, *as well as other particulars.*

Weight in Rupees.		Proposed weight. Grains.	Old weight. Grains.	New weight, less in lbs. and grains avoirdupois.
3	1 Pullum..........	540	547	7 grs.
24	1 Small seer 40 to a maund	4320	4375	55 ,,
75	Seer of 25 pullum	13500	13672	172 ,,
120	1 Viss of 40 do.	3 lbs. 600 grs.	3 lbs. 875 grs.	275 ,,
960	1 Maund..........	24 lbs. 4800 ,,	25 lbs.	2200 ,,
19,200	1 Candy..........	493 lbs. 5000 ,,	500 lbs. *	6 lbs. 2000 ,,
3,000	1 Maund(Bengal)	77 lbs. 1000 ,,	80 lbs.	2 lbs. 6000 ,,

WATER.

1 Alakoo=..............	Rs. 18
1 puddi = 54 *f.* oz. weighs..............	144
1 Marcal = ...	1152
1 Garce = ...	4,60,800

PADDY.

1 Alakoo...... ...	Rs. 14	A. 1
1 Puddi weighs	112	8
1 Marcal	960	0
1 Garce......	3,60,000	0

Were these adopted, the measures at Madras might remain the same, and the weights would be altered so little that I apprehend trifling inconvenience would be felt there.

There would be, perhaps, some disadvantage in the weights not remaining equal to even numbers of pounds English. The rupee † is not an even measure of the avoirdupois pound of 7,000 grains, and, without relinquishing it as a standard, it appears to me that this cannot be effected.

The weight of the 4 pice piece $\frac{1}{16}$ of a rupee, is about 134¼ grains ;‡ a weight, however, less convenient than that of the rupee as regards English measures.

Should a decimal system be introduced, coins as well as weights must be altered. The unit might then conveniently be the English pound sterling; the rupee being one tenth, and smaller coins, tenths and hundredths of it, the latter very nearly corresponding with the English farthing. The foot would be the unit of length, the rupee's diameter being one tenth. The weight of one pound sterling, or ten rupees in silver, might be the unit of weight, and the quantity of water weighing ten rupees the unit of quantity. The advantage of the decimal system, and the convenience arising from its facility of arithmetical reduction, would not be felt so immediately by the native community to whom generally the decimal fractions* are unknown. For them the continued division by 4 would be more convenient, as it is that to which they are accustomed, and to which their notation is adapted. It also should not escape remark that the proportions of weights, &c. however arbitrary they may seem, have doubtless been regulated by convenience, and relatively to the value, the size of the packages, and the methods of transporting the articles weighed or measured.

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* It may be remarked that the *Candy* being fixed at 500 lbs. English, and the *Maunds* at 25 lbs. and 80 lbs. shew European alteration already effected.

† The Company's rupee weighs 180 grains, or 3 drams apothecaries weight ; 32 rupees weigh one pound apothecaries or troy weight ;—350 rupees weigh 9 pounds avoirdupois weight. A cubic foot of water weighs 1,000 ounces avoirdupois, or 437,500 grains, or 2,430 $\frac{5}{9}$ Rupees.

It is much to be regretted that the Commissioners in England should have preserved the two different pounds weight, or at least that they should not have made the troy pound and avoirdupois pound to bear a more convenient proportion to one another than 5,760 to 7000.

‡ If the alloy of the rupee is copper, the value of that metal appears to be $\frac{1}{39}$th part of that of silver—and the rupee worth 6,450 grains of copper nearly.

VII.—*On the Induration of Mortar.*

The paper on this subject in the April number of the Journal, has recalled my attention to an enquiry which formerly much interested me, and its general usefulness will be my excuse for offering the following observations on it.

The strength of cements may be compared by attaching bricks to a wall of the same material, added one by one (each being allowed to dry before a second is applied) until by the weight the cohesion of the cement is overpowered, and the mass breaks off from the wall. In the 285th page of Barlow's 'Essay on the strength and stress of Timber' some experiments made by J. Brunel, Esq. in this manner are mentioned; and, by comparison with these, the relative cohesion of Indian and British cements may be ascertained.

The use of sugar *(jaggry)* in the preparation of cements is attributed to two causes; its being partly composed of carbon and oxygen, and consequently able to afford carbonic acid to assist in the conversion of the hydrate of lime into carbonate, and the property that substance has of, in a peculiar manner, facilitating the solution of the alkaline earths in water.

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* India in bestowing the decimal arithmetic upon Europe seems to have forgotten it herself. At least the Mahrattas, Canarese, Malialies, Telingas, and Tamulians as well as the Musulmans, make use of different fractional systems, while the notation of the Tamulians and Malialies, is very defective, compared with the rest, the digits not deriving value from position, so that thirteen of them are required to represent the number 2,234,567.

The publishers of books in the native languages would have done well to have made use only of English numerals and notation, which would have assisted their introduction throughout India.

Since the forms of 5 of the 10 digits are the same in English, Mahratta, Sanscrit, Canarese and Teloogoo, there can be little doubt that an order that the English notation only should be used in Cutcherries after the 1st of January 1837, would be easily obeyed, and it may be remarked that were the English figures used, it would be easy for the European officers themselves to examine and correct accounts without translation, and that the copying of them might be saved by having the headings written in the native languages, and those translated in English. Considering how voluminous accounts are, the saving of stationery and writers' labour would not be so trifling as to be unworthy of consideration.

The European vulgar fractions are infinitely more convenient than those of the natives, both Hindoos and Mahomedans, which, among other objections, admit only of a limited number of denominators.

With regard to the *jaggry* supplying carbonic acid to the mortar, I have made the following calculation, shewing that, in order to give sufficient carbon, 48 parts of sugar must be mixed with every 100 of unslaked lime. But, as the quantity used is but one lb. to 288 lbs. of slaked lime, it appears improbable that the *jaggry*, if useful, is so on this account.

4.68 parts of hydrate of lime contain	To which add 1.73 parts of sugar containing	There will result
3.56	Lime.......... 0	3.56 lime.
.94	Oxygen........ .801	1.741 oxygen.
.185	Hydrogen..... .179	.75 carbon.
	Carbon......... .75	.364 hydrogen.

To which, if .259 of oxygen, obtained from the water or air, be added, there will be oxygen and carbon in the due proportion to make 2.74 of carbonic acid; which, with 3.56 lime, will form 6.30 carbonate of lime. Now 3.56 : 1.73 : : 100 : 48.

It must be particularly noticed that, in order that the mortar should harden, it is not merely necessary that the lime should be thoroughly carbonated. Common chalk and shells are as completely carbonate of lime, as are the calcarious spar or marble; yet the hardness of the former substances is very inferior to that of the latter.

The hardness of the mortar probably depends upon crystallization. A writer, quoted in the Encyclopædia Britannica, says, that the lime crystallizes and entangles the sand in its crystals. Now, in order that crystallization may be effected, it is requisite that the crystallizable matter be dissolved, in the first instance—and the *jaggry*, in assisting the solution, probably assists crystallization. The use of lime water—*i. e.* a crystallizable solution of lime in water, instead of common water, has, I know, been practised by the Madras engineers at Nagpore, if not elsewhere, and with good effect. Water dissolves but 1-450th part of lime, but the addition of sugar would enable it to dissolve a larger quantity, in proportion as a larger quantity of sugar was employed.

It appears to me probable, therefore, that it would be found a good method to use, instead of a solution of *jaggry* in water, as is the present practice of the bricklayers in this country, a solution of *jaggry* in water, which should afterwards be saturated with lime, and then made use of to moisten the mortar, when the brickwork is being built. There would thus be used, in an early stage of the building, water holding a quantity of the lime in a crystallizable state, which, as I have found from experiment, would rapidly deposit crystallised carbonate of lime and assist the mortar in hardening. The deposit takes place even under water, shewing, perhaps, a property necessary in water cements.

In Spain, and in some parts of this country, a mixture of chunam and fish oil is used for the purpose of defending the bottom of vessels, to save the expense of coppering them. This composition gets soon covered with sea-shells, and it is necessary to chip it off and replace it every now and then. When first applied, it is soft as putty, but in the course of a fortnight it hardens, and after some time becomes so hard that it is cut with a heavy axe with great difficulty. It appears likely that this would be found a very useful water cement, especially with sea water, and, as it is not likely to make any great difference with what description of oil it is made, a cheap one, too.

I am not chemist enough to answer the question whether the sugar and the oil act upon lime after being changed into a state analogous to oxalic acid. It may be useful to remark that the three substances are composed of the same elements, and not in very different quantities, and that oxalic acid is that which has the strongest affinity for lime as well as for magnesia.

The quantity of lime that should be mixed with sand, in order to produce the strongest mortar, has been frequently discussed, and very various indeed have the results of these discussions proved—as, indeed, might have been expected from experiments which do not appear to have been carried on in the same manner. The first paragraph of these remarks shews a good and easy method of trying the cohesion experimentally. Theoretically, it may be considered that all that is not brick or stone in a building must be mortar, in order that it should be one solid mass. In like manner, it may be considered that all that is not sand in a quantity of mixed mortar which has dried should be crabonate of lime. Now, if you take a tumbler, and fill it with dry sand, you may afterwards pour into it without spilling rather more than half as much water (by measure) as you put sand: consequently the sand does not *fill* half the space that it occupies. Hence it would appear that mortar should consist by measure of equal quantities of carbonate of lime and of sand—or further, that, since 630 parts of carbonate of lime contain 356 of lime, that the proportion should be 356 parts of lime (or 468 parts of hydrated, or slaked, lime) to 630 parts of sand—which is nearly in the proportion of two to three. It is to be remarked that if coarse sand be mixed with fine a larger part of the space occupied will be filled; and also, that this proportion of two to three is that in use among *maistries* in this country.

With regard to the quantity of mortar that should be used with bricks, this must depend on the closeness and goodness of the work. If 1,000 bricks of the regulation size (the thickness of which, by the bye, is too great for the native method of burning bricks) be allowed to 66 cubic feet, and 100 bricks are deducted for breakage loss by carriage, &c. the remaining 900 will fill 47¼ feet, and 18¾ remain to be filled by mortar; or as a *parrah* measures 2⅝ feet, about 6 *parrahs* and a half—so that 2⅔ *parrahs* of slaked lime, 3⅜ *parrahs* of sand, and 900 bricks, appear to be a just proportion. B.

VIII.—*On the Homöothermal method of Acclimating Extra-Tropical Plants within the Tropics.—By* ROBERT WIGHT, ESQ. M. D. &c. &c.

TO THE EDITOR OF THE MADRAS JOURNAL.

DEAR SIR,—Believing the views, propounded in the accompanying observations on the acclimating of extra-tropical plants in tropical climates, of much importance to this country, I am very desirous of having them speedily subjected to the only test that can determine their value—carefully conducted experiment—both in India and Europe: you will therefore much oblige me by giving them a place in the forthcoming number of the *Madras Journal.* Early publicity is desirable, because it is to the philosophers of Europe (enjoying as they do unrivalled facilities for conducting the enquiry, as well by the juxtaposition of two climates, as by their skill in performing experiments) that we must look for the final determination of the truth or fallacy of my deductions from the few facts already ascertained. As the paper was originally written while encamped on the Pulney mountains, separated alike from books and every collateral source of information, I do not hold myself responsible for having overlooked the works of other labourers in the same field, if such there be, for truly I know of none. The principles have long been public property, but their application, in the manner here proposed, has never, I believe, been recommended by any one.

I remain, dear Sir,
SALEM: *24th November,* 1836. Yours, &c.
ROBERT WIGHT.

Numerous analogies between vegetable and animal life have been observed and dwelt upon, by nearly all writers on vegetable physiology. This knowledge has, however, been but little applied to the advancement of horticulture, and not at all to that of agriculture; so far at least as I yet know: and I think I may with safety assert, that it has never till now been proposed, so to act upon the principle which governs the functions of vegetable life, as to alter entirely the constitution of the plant, and thereby qualify it, though originally from a cold or temperate climate, to endure, uninjured, the extreme heats of the tropics. To produce this change is the object of the Homöothermal method of acclimatizing plants: to point out how it may be accomplished, is the purpose of my present communication.

The effect of cold in preparing plants for forcing, has been long known, and is now constantly employed for that purpose, but the application of heat to seeds during the act of germination, as meaans of enabling them afterwards to resist, uninjured, high temperatures, has never been had recourse to on principle, and but seldom as a chance experiment. Two such experiments, however, have been recently recorded in the Transactions of the Agricultural and Horticultural Society of India.* These I shall briefly recapitulate, and then explain the principles on which their respective results may be accounted for, and lastly show their application to the improvement of agriculture, and the acclimating of foreign plants. The following extract, from a report of a Committee of the Society of Arts, explains the successive steps of the first of these experiments, conducted by Mr. Anderson, Curator of the Chelsea botanic garden, for the introduction of Joomla rice (a very hardy plant) into England. He was furnished with some seeds of five varieties of hill rice. " They were sown in March, and some of each kind germinated, and did very well while they were kept in the hot-house. In May they were removed to the green-house, where they became stout and healthy plants. In the end of June, they were transferred to a sheltered place in a bason for the growth of aquatic plants, having 9 inches depth of water, and 12 of mud. Here they grew and promised well till the beginning of August, when the weather becoming cloudy and rather cold, they became sickly, and were all dead by the beginning of September, without having come into flower. It seems therefore evident, that the temperature even of the warmer parts of England is not sufficient for the cultivation of hill rice."

The second was made by G. T. F. Speed, Esq. of Calcutta. He " after repeated and disheartening failures with celery and some other English seeds, at last resorted to the plan, almost unthought of in India, of making a hot bed." In this he sowed his seed on the 24th

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* Vide vol. 3 pages 88 and 89—103, 101 and 119,

November. On the 4th December they germinated, and on the 10th of January he planted them out in trenches. During the time they were in the bed he daily moistened them with water that had been exposed for several hours to the heat of the sun: and, on the 11th May, a bundle of red celery, sent to the Society with his communication, is recorded "*very fine* considering the late season of growth."

Can the opposite results of these experiments be referred to any fixed principle, governed by the laws of organic life, which, if discovered, could be successfully applied to the introduction of foreign plants into tropical climates?

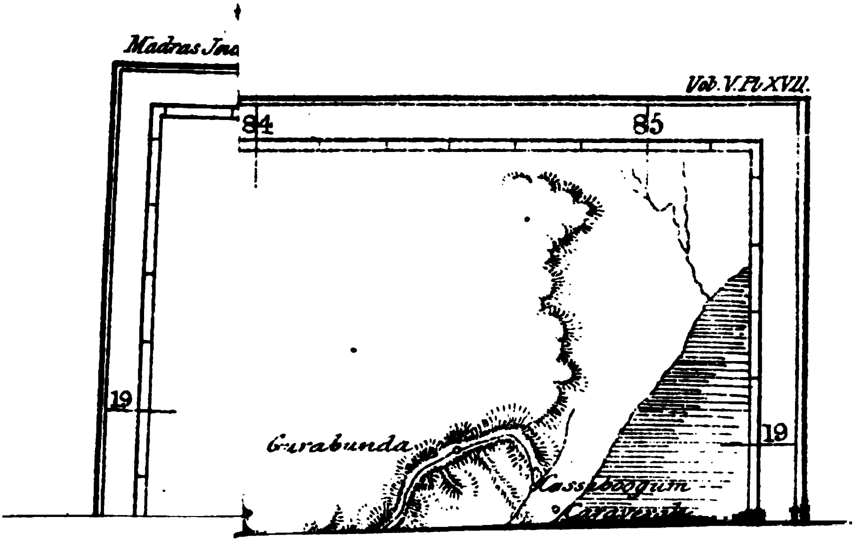
I think they can, but, to explain the principle, I must seek the aid of animal physiology, from the laws of vitality being better understood, and more cognizable by the senses, in animals than in vegetables.

Animals are endowed with a principle of life, only known to us by its effects, but the laws of which have been carefully studied. It has received the name of Excitability or Irritability (I prefer the former term) from its property of being acted on, and excited, by the application of external agents: the agents are called stimulants; and the action excitement. Excitability increases in proportion as we reduce excitement by the abstraction of stimuli, and diminishes with their application: hence a person famished with hunger has his excitability so increased, that the stimulus of the mildest food induces violent excitement, and a person frozen will, from the same cause, be destroyed by heat of a moderately warm room. On the other hand, a person in the habit of maintaining considerable excitement by the habitual use of stimulants, cannot bear their privation so well or for so long a time as one habitually temperate; nor does the same quantity of stimuli produce in each an equal degree of excitement; on the contrary, the quantity that would produce high fever and rapid exhaustion in the one, is barely sufficient to preserve health in the other. Excitement is the process by which excitability is reduced, and kept within the bounds consistent with the health and well being of the animal; and by the graduated use of stimulants, we can so modify the susceptibilities of this vital principle, that a considerable degree of stimulation becomes necessary for the maintenance of the organic actions, by which the functions of life, assimilation, circulation and transpiration, are carried on: or, by their abstraction we can raise the susceptibility so high that a slight stimulus will cause great excitement. Excitability is then equivalent to privation of stimuli, excitement to their excess. Excitability being high, a slight stimulus produces violent action, if low, strong stimulants produce little excitement. Let us now apply these principles of animal to vegetable life, and see whether they afford us a satisfactory solution of the question proposed, and prove the identity of the vital principle which governs both animal and vegetable existence.

Mr. Anderson commenced his experiment, by changing, through the application of the stimulus of heat to the germinating seed, the character of his subjects, from hardy extra-tropical, to tender tropical plants, and then concludes, that they are naturally too tender to withstand the cold nights of an English autumn. Mr. Speed by the application of heat, at precisely the same stage of their existence, changes his from hardy to tropical plants, and then successfully rears them in a tropical climate. Both are surprised at the result, while in truth, on the principles here explained, the success of the one was as certain as the failure of the other. Had Mr. Anderson sown his seed in autumn, in the open air, as he would have done winter wheat, and as is done in their native country, their power of resisting the cold of its almost Siberian climate, would easily have protected them against the much milder winter of England; while their excitability, accumulated by the long privation of the stimulus of heat, would have prepared them to start vigorously on their course to maturity with the first heats of spring, and, in all probability, they would have matured their crop in the course of the summer or early in autumn. Mr. Speed having failed in rearing celery by adopting the contrary practice, with most commendable perseverance, determined to sprout his seeds in a hot bed, and is rewarded by the possession of a plot of fine celery in May. From this *it would appear*, that plants raised from European seeds, if germinated in cool shaded beds, retain in a high degree their excitability, unfitting them for successful culture in a hot climate; but which is exhausted by the application of heat to the germinating seed, and their constitutions so modified and assimilated to the climate, as not only to resist a high temperature, but even to render it necessary to their after existence.

Does the seed of plants so altered, retain the tropical character communicated to the parent?

In the present state of our knowledge it is impossible to answer this question, as not a single fact exists directly bearing on the subject: but, reasoning *a priori*, I can see no reason for doubting that they would in the second, if not in the first generation; and if numerous and carefully conducted experiments prove this to be the case, I have no hesitation in assuming, that the two experiments which form the basis of this communication, have led to the most important and valuable discovery ever made in the science of agriculture, in connection with vegetable physiology. It is almost superfluous to add, that the obvious deduction from them is, that we may, if we choose, see the plains of India, and not of India only, but of the whole torrid zone, covered with the highly nutritious grains and roots of Europe, in place of the very inferior ones now in use. Nor need we confine ourselves



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of th now in use. Nor need we confine ourselves to the introduction of the herbaceous forms only, but may, by applying the same principles to the arboreous vegetation of temperate climates, extend it to the tropics, thereby supplying ourselves, not only with the products of the farm and kitchen garden, but of the forest and orchard. On these grounds I cannot refrain from soliciting—urgently entreating —all those enjoying opportunities of making experiments, both in India and Europe, to unite in their endeavours to confirm by repeated trials the truth or fallacy of the principles I have deduced from the facts and analogies above stated.

IX.—*Notes, chiefly Geological, of a Journey through the Northern Circars in the year* 1835.—*By* P. M. Benza, Esq. M. D.

> Sono, prima d' ogni altro, da compararsi i varii, e slegati fenomeni già posti, e raccolti dalla osservazione, e dall' esperienza, così ad uno ad uno, come tutti insieme; per vedere in che si convengano, o peravventura si differiscano.—*Scinà. Introd: alla Fisica Sperimentale.*

Masulipatam, *Jan.* 16, 1835.—We disembarked at this place from Calcutta, and proceeded to the camp, pitched about a mile from the place of debarkation. I felt distinctly that we were passing through an unhealthy, marshy situation, the atmosphere having the characteristic odour of such pestiferous places, arising from the putrefaction of the lacustrine plants the *salicorniæ* principally.

As we traversed the plain, we could not but wonder at the many human skulls scattered over it, having been, as we were told, dug up by jackals, and other animals from their untimely graves. They were those of the unfortunate people, who fell victims to the mortiferous epidemy, which, two years before, carried off a great many European soldiers, and multitudes of the natives.

Although the Right Honourable the Governor's camp was pitched some distance from the unhealthiest part of the plain, yet, the miasmatic effluvia, particularly at night, was powerfully felt. I never recollect the odour so strong, except in the swampy plains of the Acherusian lake (*hodie* Fanari), where, during the heat of the summer months, the exhalations from that vast swamp corrupt the air to such a degree, as to prove exceedingly baneful to the imprudent who ventures to sleep, even one single night, within the influence of these pestiferous exhalations. At Masulipatam, the two nights we slept there, the odour was very strongly developed.

The plain, round Masulipatam, is sandy, having a subtratum of clay. In this sand are found many pieces of a concretionary calcarious sandstone, generally speaking mammillary, such as we see in alluvial deposits[*] of many places in Europe. This is the only locality, where I did not meet with the substance, so widely spread in the plains of India—the nodular kankar.

In the middle of the Pettah, at the spot where the two principal streets cross each other, are placed erect and arranged in a circular form, thirty-three large slabs of a compact limestone, covered with numerous figures in *basso* and *alto relievo*, of the most exquisite execution; excelling any in the few places I have visited in India, containing such relics of the remotest antiquity, the Seven Pagodas not excepted. The sculptures at Masulipatam, being cut in compact limestone, of a very fine texture, are susceptible of receiving a delicacy, a kind of mellowness in the execution of figures and friezes, which it is impossible to impart to the coarse grained pegmatitic rock of the Seven Pagodas. There is such anatomical correctness in the figures, and so much nature and freedom in their positions and attitudes, that Gaggino[†] himself would have been proud of acknowledging them as his work.

These sculptured slabs were brought from the ruins of a pagoda, seven miles from Masulipatam; and, by what I remarked in one of them, they must have belonged to a more ancient building, than the pagoda whence they were brought to Masulipatam. One of the largest slabs (more than four feet high) had one of the two surfaces, convex, the other, plane. On the convex one, were multitudes of figures, which covered its whole space, representing processions, sacrifices of animals, and other religious ceremonies, said to be those of the Jain tribe. On the back surface was sculptured a reversed column, the pedestal turned upwards, and the capital downwards; showing that the two faces of the stone had been sculptured and used at two different periods, and for two different buildings.[‡]

[*] Doctor MacCulloch describes calcarious concretions found in banks of sand in Perthshire, which "present a great variety of stalactitic forms generally more or less complicated, and often exceedingly intricate and strange, and which appear analogous to those of King George's Sound, and Seewers island." Quarterly Journal, (Royal Institution) Oct. 1833, vol. xiv. page 79—83.

[†] The celebrated Sicilian sculptor in *basso* and *alto relievo*,

[‡] It is common to find sculptures on both sides of a slab, either as a friese, architrave, inscription, or other ornaments, in Greece. I discovered in the ruins of ancient Samos in Cephalonia (one of the provinces tributary once to Ulysses), opposite to Ithaca, two sepulchres; the one having on the external surface of the cover the following inscription in ancient Greek: DIONISIA VALE, (Plate 17. fig. I); and, descending into the sarcophagus, I saw, on the under surface of the same slab, some very old Greek letters, the remains of an inscription, which I could not decypher.

On the cover of the second tomb, externally, there was no sculpture, nor inscription of any kind; but, on turning it was seen, in very rude, and apparently very ancient, Greek characters, the following inscription: PHILOSTRATE ATTATE VALE, (Plate 17, fig. 2). In the island of Corfu (Phœacia, *olim*), at the summit of Capo Bianco (*olim* Leucimne) I found a tomb-stone with the following inscription: FULOENNIA FAUSTA, ANNORUM XX. VALE, (Plate 17, fig. 3). On the reverse of this slab there were arabesques, lines, &c, indicating that that side had been probably employed as an ornament in a more ancient building, before it was used as a tomb-stone.

Among the sculptures at Masulipatam there was a piece, apparently part of the entablature of an architrave, which was really in a very refined style; there were figures of lions, tigers, rhinoceroses, buffaloes and men, executed with so much taste, and so exquisitely correct, as to call forth the admiration of all who saw it.

This, and many others of the sculptures attracted the Right Honourable the Governor's attention, who on the spot gave orders for their transmission to a safer, cleaner and more conspicuous place.*

The limestone of these slabs is stratified, and has great similarity to that used for lithographic purposes (No. 1)—colour, yellowish gray—fracture, splintery and dull, occasionally glimmering—semi-transparent at the edges; in short, it resembles magnesian, or some species of the alpine, limestone. I was told that it is quarried on the banks of the Kistna river, near Chindapilly.

GOODOOR, *January* 19.—The subtratum to the alluvial sand, in the plain between Masulipatam and this place, is blackish clay (No. 2), containing some fresh water shells, such as *ampullaria, planorbis,* &c. (No. 3). Just before reaching Poomroo the sandy alluvium is succeeded by the black cotton soil, in which I found also *ampullaria* and *planorbis*.

WHEYOOR, *Jan.* 21.—Cultivation of all sorts of grains appears to prosper in the environs of Whehoor, and the black soil prevails, in which are found, even at one or two feet depth, under the surface, fresh water shells, of species now existing in tanks.

BEZOARA, *Jan.* 22.—All the plain between Whehoor and this place has the usual uninteresting, monotonous appearance of the plains of India; but close to the village of Pattamotta, not three miles from Bezoara, we were relieved from this dispiriting sameness, by the sight of elevated land and hills. The knoll, at the foot of which the village stands, is hardly 40 feet above the plain; and another near it has somewhat less elevation. Both are formed of a variety of gneiss, which contains garnets instead of mica; although, in some blocks we see this last mineral not only added to the other three, but sometimes predominating over them (No. 4). We shall see, hereafter, that, in the whole province, this is the predominant rock; the quartz of which has a gray colour, the felspar white, with the appearance and nature of albite; the garnets, generally amorphous, but occasionally crystalline, and of the common colour.

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* They have not yet reached their destination, the Museum of the Literary Society.

The different colours of the minerals give to the rock a fine appearance. The direction of the strata in these hillocks is N. and S. dipping east, and, as far as could be judged at that distance (3 miles), the hills west of these last are formed of the same rock, the direction and the dip of the strata being the same as of the eminences near Pottamotta. This species of gneiss seems to decompose easily, the albite being the mineral to decay first. Many blocks, both loose and fixed in the soil, are seen between Pottamotta and Bezoara. This last town is situated close to the left bank of the Kistna, at the eastern side of the hill, whose western base, is washed by the river during the freshes. Two ranges of hills, having the same direction, viz., N and S., confine the river in a kind of gorge; the one to the north, the other to the south, and therefore running in a direction at right angles with the course of the river. The height of both these ridges seems to be the same, about 600 feet above the river.

The water in the Kistna at this season is hardly one-third of the breadth of the river during the monsoon; but during the freshes the waters expand, filling the whole breadth of the bed, reaching the foot of both ranges of hills; and then the stream must be at least a mile and a half broad. It appeared to me that, both above this gap of the hills, through which the river runs, and below it, the country is flat, and nearly on the same level; therefore, what I have read in some publication, of the waters of the river having cut through this chain of hills, does not appear very probable.

In the alluvium, many strata of which are seen on both banks in an horizontal position, are composed of a coarse sand, alternating with those of a greyish clay (No. 5). The rock forming the hill, at the eastern foot of which Bezoara stands, is the gneiss I have just described, the strata being very much distorted and inclined, dipping south. It is not rare to see entire strata formed exclusively either of quartz, or felspar, or hornblende rock, which last lies, dyke-like, among the gneiss.

The direction of the strata is N. E. and S. W. nearly perpendicular to the course of the river, which at this place runs N. W. and S. E. Gneiss is the lowest visible rock about Bezoara, the contortions of the strata of which are well displayed in the sections of the new road at the base of the hill to the left.

GUNNAWARUM, *Jan.* 23.—Early in the morning we passed over a ridge, the continuation of the Bezoara hill, running eastwardly; it was still dark, so I could not distinguish the nature of the stone composing it; but some specimens I picked up in the road, proved to be garnetic gneiss, analogous to that of Bezoara. The plain near this place displays hardly any blocks of stone, either loose or implanted in the soil, except near a deep nullah, where are many masses of quartz-rock, which must have been brought from the distant high hills to the north, and accumulated there for the purpose of building a bridge; the few projecting rocks are the usual garnetic gneiss, often decomposing, the garnets assuming a cancelated structure (No. 6).

This gneiss, like all primitive Indian rocks, whether stratified, or massive, contains immense beds, or veins, of quartz. When the other minerals decompose and are removed, the quartz must protrude, and, deprived of support, split into fissures, the pieces being scattered in the plain; or, if the rock be in the declivity of a hill, it is hurled down into the ravines and valleys. In one place, to the right of the road, there is a little elevation of sandstone, with a few blocks projecting at the summit (No. 7) which sometimes assume the conglomerate structure, resembling clay prophyry (No. 8), or conglomerate sandstone (No. 9); over the whole plain, pebbles of quartz and of sandstone are very abundant.

Appoorapet, *Jan.* 24.—The Right Honourable the Governor having resolved to stay here for the remainder of this, and all the following day, I did not miss the opportunity of examining the diamond mines, which the Honourable Mr. Russell informed me were only six miles north of this place.

Having made my arrangements for the journey, a tent accompanying me, I started at 5 o'clock next morning in a palanquin. After about three miles having traversed a plain of some extent, near the village of Shingoonoosoondum, the guide, who had assured me, with an oath, that he knew the place, began to talk with every person he met, *sotto voce;* which led me to suspect he was ignorant of the place we were going to. Fortunately, meeting a man who understood Hindostanee, and having the memorandum, with which Mr. Russell kindly provided me, of the name of the village close to the mines, I asked for Mullavelly, and immediately the man pointed out a tuft of lofty trees, in the middle of which were seen the huts of the village, I was in search of. He took me, at my request, to the headman of the village who conducted me to the pits, answering, with a captivating affability, all the questions I put to him in our way to the excavations.

The road from Appoorapet to Mullavelly, lies along a sandy plain, which, I am told, is swampy during the heavy rains. Approaching the last mentioned village the plain is bestrewed with blocks and fragments of a very hard conglomerate sandstone, some pieces being of a purplish colour (No. 13). There are also some large blocks of garnetic gneiss, in a state of decomposition (No. 14). But the red sandstone abounds most, although rolled pieces of quartz, with a covering of a ferruginous clay, or carbonate of iron, together with the conglomerate sandstone, are scattered over the plain.

The hollow flat, where the diamond pits are excavated, was a low swampy plain, at the season I visited them, the lower part only containing some water. Being surrounded by a bank, or rising of the soil in a circular manner, it has the appearance of having been once a lake. The banks are formed of the red ferruginous sandy soil, prevailing all round this place; through this plain no river or rivulet flows, and the pools in its lower part dry up about the month of March; and it is then the time when the excavations may be commenced, and not before.

The few hills I could see near this place were those to the north, not above two or three hundred feet above the plain, and covered with underwood, interspersed with large trees. Some miles beyond these hillocks runs another range of hills, loftier than the nearest ones, having, however, the same direction.

The diamond pits are in general excavated at the north end of the bank that surrounds the hollow. Judging from some which were dry, the deepest could not be more than 12 feet; and I observed that, whatever their depth was, they never came to a hard mass of rock. The strata which they penetrate during the search are—first, a grey, clayey, vegetable mould, about a foot or two thick; below this an alluvium, composed of the following pebbles, (not including the diamonds) which have evidently undergone attrition, their angles having been worn off: sandstone similar, to the one already described—quartz—siliceous iron—hornstone—carbonate of iron—felspar—conglomerate sandstone, and a prodigious quantity of kankar, or concretionary limestone (No. 15). Of this last mentioned rock, we must say a little more than of the others; the reason is obvious—namely, that the gem is the base of the acid in the calcarious stone.

Besides the numerous pieces of this concretionary rock, scattered on the surface of the soil, and also intermixed in large quantities in the diamond alluvium, it forms regular strata, or veins we might call them, in a horizontal position, both in the vegetable earth, and in the diamond alluvium, precisely like flints in chalk. Many of the pebbles of quartz, and hornstone are not only varnished, as it were, with a ferruginous *enduit*, but it penetrates into their substance. This kankar contains not a trace of quartz or any other mineral; and that in strata, in the vegetable soil and in the diamond alluvium, is more friable than that exposed on the surface of the ground.

It is in this alluvial detritus that the diamonds are found; my specimens were taken from a heap, on the brim of the last excavation, made five years ago. From this refuse, the headman told me, were obtained, as many small pieces of the gem, as might fill, the hollow of the palm of the hand; no other excavation has taken place since.

All the pits are of an irregular form; generally, oblong; the headman told me they were not more than ten feet deep; this I could not ascertain, on account of the water, with which they were partly filled.

The headman, who appeared an intelligent, obliging person, gave me the following information, in reply to my interrogatories; he always presides over the excavations, whether the pits are farmed, or are worked on account of the Nizam. The diamond is never found imbedded, or, in any way, attached to any of the pebbles, with which they are invariably associated in this locality. They are always found loose, mixed with the other little stones. On my particularly pointing out the kankar, he said the gem was never attached to that substance. On enquiring, which were the pebbles most constantly associated with, and forming infallible indications of the existence of, the diamond; he picked up from the heaps of detritus, the following pebbles—iron ore, hornstone and the kankar.

Notwithstanding the prodigious quantity of carbonate of lime in this locality, the water did not appear to contain any traces of it; and the inhabitants used even that collected in the pits.

The detritus, forming the diamond stratum, must have proceeded from the hills north, the only ones near this place; being probably the continuation of the sandstone range, which extends eastwardly from Banganapilly, Condapilly and Mullavelly, in all of which localities the matrix of the diamond is a conglomerate sandstone.

Ellore, *Jan.* 26.—This place is more celebrated for handsome women, and fine, muscular, well proportioned men, than any other in the peninsula. And indeed, among the numerous persons both young and old, who crowded along the road to see the Governor pass, I did not perceive one who could be called ugly, or who was sickly in appearance, filthy, or in ragged attire.

The Native regiment in the garrison (of course recruited from different parts of India) had suffered severely this year (1835) from pernicious intermittent and remittent fevers, the inhabitants having had likewise their share of the mortiferous scourge. Dr. Davison, a very able, well informed, zealous professional man, told me that the proximate cause of this epidemy, was, both in the last and present year, the profuse rains, which, whenever exorbitant, never failed to impart to the exhalations from the rice fields a deleterious influence, that proves very baneful to the human system. The same happens in the south of Italy, where, if on account of profuse rains, or ill-managed irrigation, the rice fields be overflown, a burning sun succeeding to them, the air in their vicinity becomes pestiferous, and very dangerous, to the cultivators particularly. We were informed, that out of five hundred men of the regiment, one hundred were in hospital; and although the disease had then abated in severity, yet many of the convalescents had engorgement of the spleen, or other abdominal viscera, which eventually terminate in dropsy, berriberri, or other *sequelæ*, most of which prove incurable, and at last end fatally. The condition in which the Governor found the hospital, although unavoidably crowded, gave great satisfaction, and did credit to Dr. Davison's zeal and exertions.

NULLACHERLA, *Jan.* 28.—The plain, which surrounds Nullacherla for some miles, is covered with a sandy soil, overspread with numerous pieces and blocks of sandstone. The grains of quartz, in this last mentioned stone, are cemented by a ferruginous paste, which gives to the rock a deep red, or purple, colour; the loose pieces apparently have undergone long attrition, being rounded, or at least their angles very much blunted. In many places there are blocks of the same rock jutting many feet above the soil, and evidently impacted deeply in it.

In these last mentioned rocks the stratification is quite evident (No. 16), and in many pieces the iron is in such a quantity that they might be called siliceous iron ore, rather than sandstone (No. 17). About half a mile before we come to this sandstone, in the middle of the road, are seen some projecting blocks, of a black colour and cavernous structure, so as to simulate lava, for which I took it at first, when at some distance; but, on a closer examination, it proved to be the lateritic stone of this part of India, differing from that of the Red Hills, and other localities of the Carnatic, in containing more quartz, being more cavernous, with more sinuosities, which are empty, not being lined by, or filled with, felspar (No. 18). It is evidently a conglomerate rock, some of the composing pebbles being carbonate of iron, of a dark brown colour. As these lateritic rocks are, as it were, impacted in others of purple-coloured sandstone, and protruding in a similar way to those of the latter rock, we may infer that the cavernous iron ore forms a bed in sandstone.

PUDDAPANGALLEE, *Jan.* 30.—About five miles before reaching this place, and between it and Yernagorium, is seen a small hillock, to the right hand side, near the road. I was riding in company with my friend Colonel Cullen, conversing on the geology of the district we were travelling through. He told me that just before us there was a very interesting phenomenon; nothing less than shell-limestone underlaying, and alternating with, basalt. Before reaching the place I saw in the dry beds of the torrents, and in the ditches on both sides of the road, a very compact, conglomerate sandstone, which I will hereafter describe.

As may be supposed I was extremely anxious to arrive at the locality indicated by Colonel Cullen, which we did, in less than half an hour.

Having reached a nullah, which ran down from the north declivity of the hillock, we dismounted, directing our horses to be taken a mile or two farther on.

In the bed of the dry nullahs, as well as along the road, were seen blocks of limestone, some of them loose, and others implanted in the soil of the declivity of the hillock. This rock has a white colour, and a fracture semi-chonchoidal and glimmering, on account of the numerous crystals of carbonate of lime, into which all the fossil shells are converted. The height of the hillock may be three or four hundred feet above the plain, and the slope of the northern side is gentle and gradual. Its form is oblong; the ridge having a north and south direction.

The north declivity is covered with blocks and large pieces of basalt, scattered and intermixed with those of the limestone. Some of the masses of the last mentioned rock were entirely composed of shells, converted into brilliant and sparry crystals of carbonate of lime. It seems, that they must have undergone violent compression, since they are fractured, and many of them crushed into comminuted fragments. This limestone is very compact, and differs from that a few yards higher, in not containing sparry particles (No. 19). Ascending still, the basaltic masses became more numerous, both loose and fixed; many of them decomposing in concentric layers, and passing into wacke (No. 20). Although this trap appears tough and of a firm compact texture, yet when looked at through a lens, it is observed full of microscopic cavities, some of them lined with a yellow powder (No. 21).

The top of this hill, which forms a kind of table-land, is capped with basalt, apparently extending a few miles eastwardly, and decomposing in concentric layers, which are clearly seen in the dry beds of brooks, having their line of separation well defined. This wacke contains no shells of any sort (No. 22). Many of the masses of basalt, on the summit of the hill, are vesicular, sometimes approaching amygdaloid, not only on the surface, but also in the substance of the stone. Not rarely, large isolated nests of this amygdaloid occur in the compact basalt, the cavities being, in both cases, lined or filled with calcspar (No. 23).

Descending a little way to the right (N. E.) we came to a thick bed of limestone projecting in a little ridge, a foot or two raised above the side of the declivity, running some hundred yards east and west, and cutting the hill in a direction parallel to its base; it appeared to be vertically situated. The outgoings of this bed are tufaceous, as well as the surface of the implanted blocks all around it, and in which the fossil shells were clearly distinguishable, such as oysters, limas, small melaniæ, &c. (No. 24). Notwithstanding the tufaceous structure of the outgoings of this bed, the limestone, when fractured deep, exhibits a texture similar to that of the loose blocks on the declivity of the hill, full of small cavities lined with calcspar, and exhibiting only the impressions of the shells, their substance having been absorbed.

The colour of this compact kind of limestone is whitish, verging to yellow, and its geological position appears to be that of a bed in the wacke, into which last the trap has decomposed; so that the calcarious rock is imbedded in, and alternates with, the decomposed basalt. Descending a little lower down, the wacke is again seen, with jasper, of a very compact structure, in the form of thick veins, or thin ramifications, or in beds (No. 25), in which, however, no fossil shells are contained, as we know to be the case in other localities in India, where the basalt overlays shell-limestone, and a similar kind of sandstone to that mentioned in these pages. The wacke being removed by atmospheric influences, these pieces of jasper are scattered over the ground.

The outlines of the hills to the eastward, appeared to indicate their being of the same formation as the one we had examined; and Colonel Cullen, who had, some years before, examined the whole of these hills, confirmed my surmise; with the addition, that the other hills being loftier than the one we stood upon, and presenting deeper nullahs, vertical escarpments and precipices, better opportunities were afforded of seeing the position of the rocks.

This place is about ten miles from the right bank of the Godavery, in a line with Rajahmundry. Along the road to the last mentioned place, at the foot of this group of hills, immense blocks of conglomerate red sandstone are seen, apparently underlaying the limestone. Many rounded pebbles, resulting from the disintegration of this conglomerate, bestrewed the road, and lay in many of the nullahs (No. 26).

Having travelled a couple of miles towards the Godavery, I saw, in the middle of the road and in a nullah near, the outgoings of a thick bed of limestone, which in texture, compactness and composition, differed from that we examined in the hill. It was crystalline, contained no shells, was of a grey colour, with the aspect of dolomite (No. 27). This bed is evidently flanked by the wacke and basalt, which are seen, the one in concentric laminæ in the beds of brooks, the other implanted in the vicinity.*

To conclude my short account of this interesting locality, judging by what a cursory examination can warrant our saying, regarding the geological position of these rocks, it seems—1st. That the lowest visible rock is the conglomerate red sandstone, so common throughout this district†—2d. That shell-limestone is a subordinate rock to it—3d.

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* Is this crystalline limestone, without shells, of the same age as the compact kind containing them? And, if we suppose that the igneous rock converted it into dolomite, why did it not produce the same change in the other?

† Putting aside the consideration that basalt appears to be the *lowest rock*, not only in this locality, but perhaps in all the crust of our Planet.

That jasper must have had its origin in sandstone, acted on by the igneous rock, which, bursting through both the sandstone and the limestone, altered their nature.

Colonel Cullen informed me that, in the hills further east, the beds of shell limestone are seen alternating with the corresponding beds of trap, in more than one locality, and that tufaceous limestone contains the shells of large *ampullaria*, living now in many of the tanks in India.

RAJAHMUNDRY, *Jan.* 31.—During the freshes, the Godavery must carry an immense volume of water, judging by the breadth of the whole bed, which cannot be less than three miles. Puddapangallee, being ten miles from Rajahmundry, when we entered the dry bed of the river we had gone only seven miles; therefore we had yet to go three miles to the latter place, which space is all occupied by the water of the river during the rains. At this time of the year the stream is hardly half a mile broad; of the remaining breadth, there are two miles of very fine and deep sand, from the right bank to the margin of the present stream, and half a mile of the same sand on the left bank. The tide does not reach Rajahmundry, which is about 30 miles from the sea.

The sand carried down by the Godavery, is the detritus, resulting from the disintegration of the granitic rocks of the hills about twenty miles north. Were we to judge by the alluvium, daily deposited on the banks, and by the more ancient one some miles inland, the water, during the freshes, must flow with extreme velocity, after having run along a level ground, to be able to propel large rounded pieces of rocks, many the size of an orange, while the ordinary impetus of the stream carries along only coarse sand. This difference in size of the transported pebbles, according to the velocity and the volume of the water, produces in the silt deposited, and still depositing, strata of various composition. We see, therefore, both in the ancient alluvium in the plain round Rajahmundry, and in that close to the banks of the river, strata of large rounded stones alternating conformably with those composed of very fine materials (No. 28). This indurated silt is seen clearly in the left bank of the river, and better still on the sides of the Fort ditch. This conglomerate decomposes easily, however, covering the soil about Rajahmundry with pebbly shingle. Mount Delight (hardly ten feet above the plain!) is the only elevation about Rajahmundry, and is formed of this indurated, easily disintegrated, silt.

In the sandy bed of the Godavery, are found the beautiful *pietre dure*, so much esteemed; such as jaspers, agates, sardonyx, onyx, cachelong, cornelians, &c. (No. 29), mixed with black, scabrous pieces of kankar (No. 30). These stones, collected so low down the river, are not large; but, I am told that, about twenty-five miles above this place, they are commonly found of great size. They are undoubtedly derived from the decomposition of the amygdaloidal trap, which, with granite, forms the hills to the north of Rajahmundry. In the indurated conglomerate silt composed of large pebbles, are some pieces of porcelain earth (No. 31), which the natives employ in the manufacture of a fine kind of pottery, very much esteemed all over India. The decomposition of the felspar into porcelain earth, must have taken place after deposition of the fragment, while still hard and compact, so as to be able to withstand in its descent the consequences of attrition; supposing the contrary to be the case, we cannot possibly explain how so friable a body as the porcelain earth, could have been driven to such a distance in water, without crumbling into clay and dissolving.

Kankar is very abundant about Rajahmundry, and it is burnt as lime.

SAMULCOTTAH, *Feb.* 3.—About half past five this morning our road lay between two high hills; the composition of which I could not discover, on account of the darkness.

At day break we approached the village of Puddagarum: before reaching it, I went to examine some hillocks near the road. The summit of the first I came up to, was formed of sandstone of a deep red or purple colour, the grains of quartz being cemented by a ferruginous clay (No. 32). The surface of the blocks at the top is extremely scabrous and beset with sharp points.

In this hill, the sandstone overlays lithomarge, tinged of different colours (No. 33); but in others the lithomarge is overlaid by a lateritic rock. Close to this first hillock, there are two others of greater dimensions, in which the abovementioned geological position of the rocks is seen in a more defined and distinct manner.

A hill to the eastward of the first, has a kind of talus (not formed of any detritus, but by the strata of the sandstone elevated a few feet towards the hill), which extends one or two hundred yards round its foot. This rock being evidently stratified, slabs of any dimensions and forms may be easily detached, for architectural purposes, for which it seems to be extensively employed, judging by the numerous quarries worked in the talus and in the plain round it, where the sandstone is the surface-rock.

The small ridge forming the summit of this second hill is, as it were, capped with modified hæmatitic iron ore, which last rock, in this locality, is evidently stratified (No. 34). In more than one place of this hill, a bed of lithomarge intervenes between sandstone and the iron ore; this is the case at the western extremity of the ridge, where a deep well is excavated to procure the lithomarge, with which the natives mark their foreheads.

Now, it is curious to observe close to this pit, that the masses just above it are the lateritic iron ore, compact in the lower part, cavernous in the upper; but, attention is attracted by the stalactitical projections of iron ore, some one or two inches in diameter, shooting downwards, penetrating and being imbedded in the subjacent lithomarge. Some of these stalactites imitate the drippings from a candle.

The third hill, a continuation of the second, but higher than any in this plain, (being two hundred feet high, or little less,) is capped by the already mentioned lateritic stone. It is very cavernous, mixed with a good deal of sand—a conglomerate in composition—the sinuosities lined, or filled, with a whitish or yellowish clayey substance.

But, what we must not lose sight of is, that this lateritic mass is traversed by thick veins of the compact, glimmering hæmatitic ore: and the passage of the one into the other is hardly perceptible. This is one of the localities in the plains of India, which, together with those on the Neilgherry mountains examined by me, might invalidate the opinion that the laterite is a formation *per se* associated with trap.

The fort of Puddagarum is built on the summit of a hill of this sandstone; and the soil covering the plain is a red ferruginous sand containing many pebbles of sandstone and the lateritic rock just described. Next day I re-examined this locality, and clearly noted the insensible passage between the hæmatitic iron ore and the lateritic stone; in some places, this last overlaying the former, and in others *vice versa.*

Paykarow and Toonee, *Feb. 7.*—These two villages are divided by a torrent, being situated at the foot of a group of hills, which rise in a ridgy form with an east and west direction. Some hills of this group attain a height of about one thousand feet above the plain, and are thickly covered with shrubs and underwood. They are formed of garnetic gneiss with occasional strata of quartz, their direction being that of the ridge itself, viz. east and west, and nearly all of them are vertical; at least those of the summit are clearly so.

The populous village on the left bank of the torrent, is called Paykarow, the other on the opposite bank Toonee. The skeleton of the famous bandit Paykarow is seen hanging on a gibbet here, outside his own village. This marauder gave the Government much trouble many years, and defied the few troops sent against him and his associates; the gang burning, destroying and plundering the houses and property of the Zemindars, and of all who were known to be partial to their enemies. They cut off the ears and noses of those whom they thought befriended the British Government and sent them to our Commissioner, the Honorable Mr. Russell. The energetic and decisive measures of Sir Frederick Adam, carried into execution, in a prompt and determined manner, by Mr. Russell, caused the dispersion of the whole gang; many of whom were caught and hanged on gibbets.

ANUKAPILLY, *Feb.* 9.—The country, between Toonee and this place, is interspersed with numerous hills and knolls, all of them of a conical shape, covered with thick shrubby vegetation. They are formed of the garnetic gneiss; the only difference between this rock and that of other localities, is that the felspar has the composition of that variety called albite or cleavelandite.

Close to our encampment was a hill, about four hundred feet above the plain, near whose summit is a kind of grotto, over which hang two enormous masses of gneiss, which has been converted into a tiny pagoda, dedicated to the goddess Coocooresha, whose devotees must have patience to ascend 295 steps cut in the rock, besides paying their propitiatory offerings. The view enjoyed from the pagoda is magnificent. The whole hill is gneiss, and, in the large masses on the sides and above the pagoda, the stratification is well marked, the strata dipping eastwardly.

YELLAMUNGALLEE, *Feb.* 10.—The approach to this place is very picturesque, the village being surrounded by numerous hills rising abruptly to various heights, and assuming the most romantic shapes. The rock is garnetic gneiss, most of the garnets being amorphous, and decomposed into a cancelliform structure, to be explained at a subsequent portion of this journal (No. 35). The quartz strata sometimes resemble quartz-rock, and at others they are divided into many smaller strata conformable to those of the rock. The colour of the quartz is white, except in some few blocks, when it becomes of a rose colour (No. 36).

Some strata of this as well as of the other kinds of gneiss, are exclusively formed either of garnets or felspar, which last mineral, when decomposed, forms a coarse kind of porcelain earth (No. 37). The strata near our camp had a vertical position, their direction, and that of the other neighbouring hills, being about N. E. and S. W. dipping west. These strata are easily separable, and the pagoda, in ruins at its summit, is built of this gneiss, which is exceedingly well adapted for such purposes, on account of the great facility of its cleavage into slabs of any dimensions and form. The felspar has often a laminar structure, and assumes a beautiful scarlet red colour (No. 38).

CASSIMCOTTA, *February* 11.—Approaching this place, the hills are composed of the gneiss previously described; and the garnets are so numerous as to form strata exclusively. The direction of this range is the same as the preceding, the strata being nearly vertical.

The sides of some of the hills presented a chalky colour, owing to the number of decomposed felspathic strata. I must here particularize an observation which occurs in more than one place of my note book, regarding the durability of this gneiss, namely, that quartz seems to give a greater compactness to the rock, than when the other two minerals are the only ones composing it.

Besides the seams of the strata, this gneiss is intersected at all angles by many fissures, which divide the strata into rhombs, cubes and other angular forms; which is clearly seen in the two hills close to Cassimcotta to the north. The usual nodular kankar is frequently seen over the soil. This concretionary rock, met every where in the plains of India, and particularly along water-courses, seems of recent origin, and, indeed, to be daily forming.

AGANAMPOODY, *Feb.* 12.—Anukapilly being only three miles on our way to this place, instead of remaining at Cassimcotta the whole night, some of our party went to visit the residence of Sooria Pracasa Row, who has laid out his gardens, and fitted up his houses after the European fashion. Sooria is one of the Zemindars who contributed so materially to the destruction of Paykarow and his gang. He is one of the *raræ aves* among the higher class of people of India. He is very partial to European manners and adopts them (not for affectation sake). He speaks and writes the English language uncommonly well, and his pronunciation evinces hardly any foreign accent. He disregards the show and glitter, the suite of attendants, the umbrella-carriers, and other indispensable appendages of his countrymen, of rank corresponding to his own; and wears none of their ornaments. He came to visit the Governor on a superb Arabian horse, and was introduced without a single attendant. We accompanied him on his return to Anukapilly, and he conducted us to his garden, which was laid out in a most beautiful style, rich with indigenous and exotic plants and trees, before Paykarow laid his destructive hands on it, as well as on his other houses. Yet, being in some degree repaired, the garden and bungalow were in a very neat and comfortable condition, all in true European style. Some of us slept at Anukapilly, and had scarcely eight miles journey to Aganampoody, and did not leave the former village till past seven in the morning.

All the hills on the way had the usual conical shape, and were formed of gneiss. Those to the north of our camp, were quite of a different outline and form from most seen during this excursion, being of a ridgy shape, with spiry summits and naked precipitous sides (Pl. 17 fig. 4). Close to the camp was an isolated hill about one thousand feet above the plain, of peculiar conformation, being of a conical shape with a vertical, ridgy projection, some feet thick, down its eastern side from apex to base, dividing the hill into two halves, a northern and southern portion. The strata forming both sides have an opposite dip; those to the north dip northward, and those to the south, southward; thus diverging from the projecting ridge, as if from an anticlinal line (Pl. 17 fig. 5). If this vertical ridge had had a black, instead of a whitish grey, colour, as it appeared at a mile distance, I should have taken it for a basaltic dyke, bursting through the gneiss, and at the same time elevating the margin of the fractured strata. I then recollected that, at the western foot of this mountain, there was a dry deep nullah, in the bed of which were implanted large masses of common granite, projecting many feet above it (No. 39). From this I conclude that the lowest rock is common granite, which elevated, and intruded into, the stratified rock.

The appearance of the spiry, sharp-peaked mountains to the north, seems to countenance the above mentioned surmise; nor can we suppose the enormous blocks in the bed of the nullah to be erratic boulders; because many had their extensive, convex surface a few inches only above the bed of the torrent. The other rocks in this plain, are loose pieces of lateritic iron ore, and below the soil a thick stratum of kankar. Carbonate of soda incrusts the indurated sandy soil in some places (No. 40).

WALTAIR, *Feb.* 13.—From the last encampment to this place the hilly appearance of the district continues; the rock is gneiss, the strata highly inclined, and, in some hills, nearly vertical, and traversed by fissures, which, cutting the seams at an angle, the naked sides of the hills are thereby marked with lozenge shapes. The plain before reaching Vizagapatam, is covered with a white efflorescence, like hoarfrost, produced by the small crystals of muriate of soda, deposited after the evaporation of the sea water, with which this soil appears to be impregnated. Numerous pits are dug in the soil, close to the hill of gneiss in the road to Waltair, to obtain the shells many feet below, which are burnt for lime; generally they are salt-water shells. If my memory does not fail me, a portion of this plain has been lately drained, by which the air, before proverbially unhealthy, has been rendered pure, and many thousand acres of land have been reclaimed from the sea.

The hills about Waltair are gneiss; some of the strata are exclusively formed of garnets, sometimes containing more mica than in other localities, occasionally in nests (No. 41). The way from Vizagapatam to Waltair lays through rocky knolls, hillocks and masses heaped one over the other, and before reaching Waltair there is an undulating sandy plain (perhaps not a quarter of a mile broad) of a red colour, the result of the disintegration of the gneiss abounding with garnets.

Bimlipatam, *Feb.* 14.—It seems that the range, or at least a branch, of the mountains composed of gneiss terminates in abrupt cliffs and precipices in the sea, a few miles north of Waltair. The tide ebbing after midnight, we availed ourselves of that time to start from Waltair, the road which traverses the shore and passes over the large masses of rock which jut out into the sea, being at that time passable. This spur of the gneiss forms rough tabular masses, which, in a vertical position, extend some way into the sea; and, although the moon shone bright, I could only discriminate the position of the strata. The specimens, which I broke off as I passed, proved to be the gneiss, which prevails in the road we followed.

The hill at the foot of which Bimlipatam stands is also composed of this rock, the strata being in no way contorted, although very much inclined. This is the case, likewise, with this rock, in other localities of the Northern Circars; differing from other species of gneiss common to the table-land of Mysore, and extending as far as Erroad, which are tortuous and twisted in all directions. The summit of this hill is capped with an enormous tabular mass of a lateritic stone, placed horizontally over the bassets of the vertical strata of the gneiss (No. 43). This cavernous, ferruginous clay-stone imbeds very large pieces of the subjacent rock, not only near its surface but also deep in its substance. The nearly vertical position of the strata is seen better than in any other situation of this hill, in the sides of the tank close to the ruined house, which is cut in the hard rock. It must be remarked, that, at the points of contact between the gneiss and the lateritic rock, the former is very much infiltrated with iron.

Vizianagrum, *Feb.* 16.—The plain, for many miles round Vizianagrum, is sandy, mixed with some pieces of quartz; below the soil, in one or two nullahs, are strata of nodular kankar, occasionally imbedding pebbles of hæmatitic iron; the stalactitic kind of this ore being also common (No. 44).

Behind the barracks and the bazar of the Native Regiment quartered here are some hillocks quite different, in aspect and form, from the gneiss rocks we have described. It is common granite, having the mica both disseminated and in nests, and contains a good deal of quartz. Enormous masses of this granite are heaped up in great confusion, some of them placed, tor-like, one above the other; many rest on the convex surface of others, which are deeply fixed in the ground. On the surface this granite has a brownish black tinge, but it is whitish grey in the fracture. When the mica is wanting and the felspar scanty, the rock resembles quartz-rock. Close to these hillocks some blocks of lateritic rock are seen, which have the same position as the granite, that is, implanted in the soil.

The black soil in this locality, as in other places, has a substratum of nodular kankar, besides the tufaceous kind scattered on the soil. In the dry bed of a brook, I saw enormous blocks of this last mentioned rock jutting forth.

COTTEEPOLLIUM, *Feb.* 18.—We left Canada this morning at half-past four. I employed about an hour in examining a hill to the north of the road, not more than two miles from this place. It is rather steep, about four hundred feet from the ground, formed of gneiss abounding in garnets. At the summit I looked for lateritic ferruginous clay-stone, but I did not see a trace of it, nor in the declivities, except a few erratic pieces in the talus. It is in this locality, that I first saw some blocks of garnetic gneiss, with strata very much distorted, their parallelism being not affected. Those on the summit were vertical; at least the bassets of vertical strata were seen running in a direction N. and S., while those on the eastern and western sides appeared to diverge (having the same direction as those of the summit) anticlinally, the western dipping west, the eastern to the east. This hill, and another near, were surrounded with a talus at their base, an unusual occurrence in India. The kankar is abundant.

CHICACOLE, *Feb.* 19.—As it was hardly day-light when we left Cottapollium, I could not distinguish the character of the rocks, projecting here and there close to the road, which appeared of a black colour, and probably were greenstone, or basalt. On arriving at the camp I saw many masses similar in appearance to those passed early in the morning. These were hornblende slate, and those previously seen were probably the same rock, both being in immense tabular masses laid one over the other horizontally, or placed in an erect position, the raised extremities leaning against each other, or heaped together, without any regularity or order; when the quartz was scanty, the rock became characteristic hornblende slate (No. 45).

The highest hill, about five hundred feet above the plain of Chicacole, is composed of garnetic gneiss in a state of decomposition, the strata nearly vertical. From the north side of this hill, is seen projecting along the plain, in the manner of a dyke, many blocks of hornblende rock; and at the foot, facing north, is an enormous vein, or rather bed, of quartz rock, many yards thick, whose outgoings form a kind of shelfy projection at the base of the hill; the direction of this bed being east and west. Most of this latter rock consists of the intimate agglutination of angular pieces of transparent quartz, without any apparent cement (No. 46); although in some parts they are united by a clayey ferruginous paste, producing a kind of silicious puddingstone (No. 47), or claystone porphyry.

SITTUMPETTA, *Feb.* 23.—In the middle of the new Palconda pass. This road, which has lately been constructed, is cut through a group of hills, covered to the summit with thick impervious forests of gigantic trees, the road lying along the tortuous valleys, and intricate paths at their base. On account of the thick arboreous vegetation, the prevailing rocks are seen now and then only, jutting through an occasional avenue, or in the openings between the trees, or, more perfectly, along the space which has been cleared for the road. They are all of hornblende slate, the strata of which are well defined; the same rock, found near Chicacole, is probably a diramation of this centre group, which appears to give off branches in different directions.

This schistous diorite has a bluish colour, on account of the large quantity of hornblende entering into its composition—its fracture is splintery and glimmering (No. 48); and when the felspar predominates, the colour changes into whitish. In most of the places we have been journeying through, all the hills, knolls and elevations, and projecting rocks of any altitude, have been of the class of primitive stratified rocks, but, the reader must have remarked, that, wherever opportunities of observation occurred in deep nullahs at their base or in the valleys, common granite formed the lowest visible rock. This is the case in the Palconda Pass; the beds of the torrents, which occupy the narrow and deep valleys among these closely crowded hills, show blocks of granitic rocks, deep in the ground, composed of quartz, felspar and a few garnets (No. 49), and exfoliating in concentric laminæ, as other granites do.

Below the soil of the valleys through which we passed, the kankar formed, as usual, a substratum. Some of the hills, near the eastern end of the pass, present denuded, vertical, precipitous façades, which permit of no vegetation, and the stratification of the rock is displayed in the most striking manner. This place recalled to my mind the awful escarpment of the northern side of the Holykooldroog, facing the Koonoor Pass (Neilgherrics) the summit of which presents to view the immense strata of hornblende, which rock forms in most places, the extreme vertical precipices of the Neilgherries.

NEEMGAUM, *Feb.* 25.—The Governor and party, left Cootoor at 4 o'clock P. M. to visit the western end of the pass, the strong hold of a gang of desperate marauders, who, during many years, issued thence to commit highway robbery and murder, maiming those whom they thought friendly to Government; the wild imperviousness of the place, rendering it almost unassailable by regular forces.

Close to Neemgaum is a hill about 1000 feet above the plain, covered on all sides to the summit with thick jungle, and almost inaccessible. Only a few masses of rock, are seen on the sides and at the top. At the base, however, and some way up, many blocks are seen apparently of the same nature as those on the sides. Many of these are *in situ*; but some have evidently been hurled down from the summit or sides of the hill. They are all hornblende slate, probably a diramation of the Sittumpetta group, being composed of felspar, hornblende in large proportion, and a few garnets—the fracture glimmering and texture extremely tough (No. 50). Although, generally speaking, this rock is stratified, yet there are some blocks that put on the appearance of a granitic, unstratified rock. There is a huge block, just above a hamlet, at the southern base of the hill, which seems to have been precipitated from near the summit of the hill, where many similar are perched, nodding to their fall. This mass, of an oblong shape, is traversed in different directions by regular dykes, either of hornblende, or of greenstone. The diagram (Pl. 17 fig. 6), is meant to represent this block: A is the longitudinal face of its north side, and B the fracture perpendicular to it. Along the lower margin of the northern side, runs horizontally a very thick dyke, the line of demarcation, between the intruding and intruded rocks, being well marked. The dyke having reached the middle of the mass, bifurcates to inclose an oblong mass of felspar, which follows all the wavings of the dyke which thus imbeds it. Looking at the fracture B, we see that the dyke of greenstone did not penetrate so far into the substance of the hornblende slate, as to burst through the other side of the mass; but, having intruded some inches, ended in the substance of the rock (Pl. 17 fig. 7). The texture of this hornblende slate appears to have suffered no change, by the contact and proximity of the dyke. This dioretic rock is of a composition common in India, entire strata being formed of hornblende with a few garnets, and others of felspar alone. The greatest number of loose blocks along the road, from Neemgaum to Kimidy, are gneiss, composed of quartz, felspar and garnets (No. 51). Some masses have occasionally a small stratum, a few lines, of gold coloured mica in the seams.

KIMIDY, *Feb.* 23.—At day-break I saw a hillock near the road, formed of immense unstratified masses, which proved to be common granite, with the addition of a few garnets. Although this rock is unstratified in the large, it is laminar in the small, on account of the mica being placed in parallel laminæ. The felspar is in large well-formed crystals in some masses. Close to the town of Kimidy are many erratic blocks of hornblende rock.

March 1.—I rose early this morning, with the intention of ascending to the summit of the high hill which rises behind Kimidy, and had mounted nearly half way up, along a fatiguing path, when a thick fog descended from the top of the hill, and in a few minutes enveloped it in obscurity. I waited patiently for some time, but, seeing no prospect of the weather clearing, I pushed on towards the summit, and proceeded about twenty minutes, groping my way all the time, both on account of the darkness from the fog, and the slippery nature of the path, which was full of loose stones, rendering my advance difficult and laborious. At last, seeing that there was no hope of the speedy clearing up of the weather, and the time for departure approaching, I descended; breaking some specimens from the blocks on my way. They were of garnetic gneiss, the garnets decomposed, assuming the cancelliform structure. The direction of the strata was E. and W.

GARABUNDA, *March* 2.—Four miles before reaching this place, I remarked, just in front of us, a very black looking hill, apparently formed of a single enormous block, of an oval form; one third of the broadest part of which was buried under ground. At a distance of two or three miles I took it for basalt; but, on nearing it, I saw no fissures, no columnar structure, no step-like sides, but, an uniform, convex surface. It was about 400 feet high, and when we came abreast of it, another hill, not so lofty, was perceived behind, very convex, and lying against the eastern side of the former one (Pl. 17 fig. 8). These enormous monolithic masses were unstratified, with no trace of split or fissure; the natives call these rocks Chittabunda. Being hardly half a mile from the road and one from our camp, I went to examine it leisurely. On a nearer approach it was evident that they were formed of porphyry, composed of very large, well defined crystals of pearly felspar, imbedded in a paste of hornblende (No. 52). On the convexity of the lower rock to the east, were scattered many tabular masses of the same porphyry, of different angular forms, such as rhombs, cubes, parallelopipeds, &c., all evidently portions of the thick concentric laminæ, into which this porphyry exfoliates. The most striking of these tabular masses is seen in the eastern side of the highest of the two hills, where it hangs from the precipitous face of the rock by a very precarious hold (Pl. 17 fig. 9).

The crystals in this porphyry are very large, many of them being two or three inches long, and many lines thick. It is worth remarking, that nearly all of them are placed in the rock in the same direction, and parallel to each other; at least that is their position on the surface, and I could not see any of them crossing each other, or having different directions. The hills on the opposite side of the road, about a mile from these porphyritic masses, differ in aspect from them, being covered with impenetrable jungle, so as to conceal all rocks, that might project on their slopes and summits. Notwithstanding which, judging by the few blocks, fixed and loose, near the road at their base, they are of sienitic granite, composed of felspar, quartz, and hornblende (No. 53); the presence of the last mineral accounts for the difference in the outline, and in their being covered with luxurious shrubby and arboreous vegetation; in opposition to the barrenness of the porphyritic ones.

The felspar of this sienitic granite is of a pale yellow, which gives to the rock a different colour to that of the same species in other localities. The hills to the north, very near to our encampment, were formed of porphyry similar to that of Chittabunda. Their black, barren appearance bespoke, even at a distance, the nature of the rocks forming them. That which we are now describing, however, differed in having some clefts and fissures, in which many shrubs take root. In this locality, many of the masses abound with hornblende, with a few garnets, the rock then resembling hornblende porphyry (No. 54), somewhat similar to that rock at Mantoo on the Neilgherries. Here I observed, what I did not see at Chittabunda, large nests, or veins, of a fine grained granite, or of pure hornblende, intruding in the usual irregular manner, and imbedded in the substance of the porphyry.

In general the crystals of felspar are white, but, not rarely, of a reddish colour. On the last described hills were seen rhomboidal and cubic masses like those at Chittabunda, either suspended from the nearly vertical façade, or laid on their convex surfaces. To the south of our camp, facing and hardly two miles from the porphyritic ones, are some hills, the continuation of those of the same nature opposite to Chittabunda, of similar outline, and covered by the same thick vegetation.

CASSIMBOGA, *March* 3.—This village is fourteen miles from the last stage. The pass of Cassimboga is the eastern end of the Sittumpettas; the strong hold of the famous Paykarow, Garolle, and their associates. The narrowest part of the pass commenced about three miles from our last camp, but its whole extent from Cassimboga is eight miles. The Governor wished to survey the place where had been perpetrated hundreds of murders and robberies, the victims being sometimes mutilated to annoy the Government, which was taking every measure to suppress this gang of assassins, which kept the whole province in the greatest confusion and alarm. We did not leave Garabunda until half past six; the road lies between two ranges of hills, along the narrow valleys at their base, which, until two years ago, were covered with thick jungle, almost impervious, except along foot paths known only to those who frequented them. The horizontal branches of the gigantic trees, crossing each other and descending very low, rendered the path difficult and laborious, giving full scope for the attacks of robbers, and, in case of their being assailed, enabling them to resist any force sent against them.

Some of the spurs of both mountains extend more than others into the little flat, the pass contracting in those places. In these narrow spots the gang awaited their victims; and, in such inaccessible positions, a few persons could defy all troops opposed to them. Besides their natural strength these places were guarded by parapets of mud, with a ditch behind them, extending from one to the other, leaving only a very narrow space for passengers. Even this precaution did not appear to them sufficient security. They piled up entire trunks of trees and brambles on the summit of this imbankment, rendering it nearly impregnable. Two or three of these trenches extended from one extremity of the pass to the other. After having resisted several years, the present government put a stop to the iniquities committed by this gang. The officers sent against them, got information of an intricate by-path, full of dangers, on account of the numerous wild animals and the probability of being lost in the jungle. But, English bravery is not easily daunted by difficulties, and in the night the guides succeeded in conducting safely the attacking party to the rear of the enemy. The success was complete; the military entered the marauders' villages, set fire to them, and the conflagration of their homes was the first intimation they had of their being surrounded. Of course, they had recourse to the *sauve qui peut*, and scrambled up the hills. Some were taken, others killed; it ended in the total destruction of this abominable nest of villains. This pass, after the extinction of the gang, was cleared, and a spacious road formed, flanked by several hundred yards of clear ground.

We have said, that the hills of this pass are porphyritic to the north, granitic, to the south. A mile or two from the eastern end, a dyke of basaltic hornblende is seen (No. 55), flanked to the west by projecting masses of porphyry; it is of moderate thickness, and many hundred yards long; some of the exposed blocks have a cavernous or amygdaloidal structure. Further on, at a little distance from the road (S.), I saw another dyke of the same trap, capped by a stratified rock, seemingly gneiss.

After passing these dykes, all the hills and knolls to the left were of the already described porphyry, and those to the right, granitic. Only one hill, about four miles before reaching this place, is of a different composition. Its lower part was porphyritic granite, the crystals of felspar being neither so large, nor so well defined, as in the porphyry of the pass, but yet the rock was unstratified, in immense masses, exfoliating concentrically. This granite is overlaid by gneiss, resembling that of Kimidy, with a profusion of amorphous garnets.

In the brief manner these cursory notes permit, we may draw the following conclusions, with regard to the geological features of this noted pass. The hills, which confine it to the north, are porphyritic almost exclusively; those to the south are, in general, gneiss with garnets, with one or two hills of granite. The porphyritic formation seems to extend as far as the Mahandry mountain (N.), the highest in this district, which does not appear to have the conformation, outline, and black aspect, of those formed of porphyry. The soil all along the level of the pass, is sand and clay of a reddish colour; the nodular kankar forms the stratum under the vegetable soil, and is also scattered on its surface. A few pieces of loose lateritic stone were met with, but none implanted in the ground; the gravelly detritus of this ferruginous claystone on the soil was not scarce.

POONDY, *March* 5.—The sand, over the whole plain before reaching this place, is very fine grained, whitish and extremely loose. Having ferried over the river near Poondy, we proceeded to our camp, pitched on a sandy eminence, not two hundred yards from the sea. In the swamp, between the river and Poondy, are numerous blocks produced by the oysters, which are very abundant at this place, the masses projecting some feet above the mud. They are composed of nothing else but oyster shells, with little cement agglutinating them. These are the only rocks at Poondy; cut into square pieces they are used for constructing the walls of huts; with them, also, they line the interior of wells, to prevent the sand, through which they are dug, from falling in. The water of these wells, although a few yards only from the sea, is perfectly fresh and drinkable.

About two miles north of our camp, near the beach, a village is situated at the foot of a granitic hill, the rock of which is composed of a great quantity of garnets and hornblende, with felspar. At the surface of some blocks the rock appears stratified, but the huge masses at the summit are all unstratified. In the more compact pieces the felspar changes into albite (No. 56); and some, composed of a prodigious number of large amorphous garnets, are knobby on the surface, owing to the two other minerals having decomposed, and left the decomposing garnets, like small filberts, protruding (No. 57). Not rarely some masses are entirely formed of garnets, to the exclusion of the other minerals. All the black looking masses along the beach and protruding from the sea, opposite to this hillock, are the continuation of this rock.

POONDY, *March* 9.—The whole plain west of this place, and along the shore for some miles, is covered with a very thick deposit of whitish, extremely fine, loose sand, which, extending for a quarter of a mile inland, is undulated with numerous swells and small elevations of this highly comminuted sand, on which nothing but a species of convolvulus grows. In this thick stratum of sand no shells are to be found, except those thrown by the sea on its surface. Under it, however, a clayey stratum, the thickness of which it is difficult to ascertain, contains a great many shells, both salt and fresh water. This is clearly seen in the sides of wells; in digging which they always come to this clayey substratum, before water is obtained.

Many of these shells are identical with those of mollusca now living in the river and on the shore, besides the pelagic ones. The stratum of clay with shells, extends three or four miles inland, where pits are dug to procure them for lime; and these fossils may be seen, even, in the soil thrown up by the large crabs which burrow in the ground.

In the plain of Poondy we thus see phenomena similar to those witnessed at Vizagapatam, and the same inferences may be drawn at both places. There are frequent signs, along the eastern shore of the peninsula, of estuaries, or shallow bays, having formerly existed, into which rivers discharged their waters: thus the clayey stratum, containing sea and fresh-water shells, must have been deposited. When the catastrophe happened which heaved up to its present altitude this part of India, the clayey bottom of these estuaries containing shells, was raised into the atmosphere, and, at the same time, the hills around. The subsequent decomposition, and gradual decay, of these mountains, has covered this stratum of clay with one of sand.

Poondy, *March* 11.—About a quarter of a mile north of the village of Guirzinghee, two miles from Poondy, there is a ridgy hillock, two miles from the shore, not more than 200 feet high, its direction east and west, sloping gently on both northern and southern declivities; with the village of Carverà at its northern foot. It is composed of the usual garnetic gneiss, stratified. The felspar, one of its ingredients, is of the species called albite or silicious felspar, in a granular state, and also in slender needle-shaped crystals (No. 58). The cleavage of this gneiss is in the line of the seams, which renders it extremely useful for architectural purposes, as it splits easily in the usual way of masses with parallel surfaces.

This rock, to the touch has a harsh, rough feel, probably on account of the great number of the crystals of silicious felspar. The albite sometimes is in slender prisms, one or two inches long, particularly when on the surface, dispersed through the rock without regularity or any common direction; many crossing each other forming a net work. No mica enters into the composition of this gneiss, except a few plates dispersed through the rock; a few garnets, which are imbedded in the albite or cleavelandite, are not always in regular crystals, sometimes being finely granular, which gives the rock a remarkable glimmering (No. 59). Between the seams of the strata, the albite sometimes forms a thin stratum of the pure mineral, in needle-shaped crystals. Judging by the outline of the hills six or seven miles west of Poondy, it would seem that they are formed of the same gneiss as that near Carverà, the ravines, down their sides having the same reddish appearance in the places divested of vegetation.

Leaving this hill, and going north about two miles, in the middle of the road are some enormous masses of porphyry, their surface nearly level with the ground and convex, perfectly similar in composition to the rock of the Garabunda pass, the crystals as large, and as well defined. About fifty yards beyond these masses, was a heap of immense blocks of the same rock, many implanted in the soil, while others were placed, tor-like, over the surface of the former. In these rocks the crystals of felspar were better defined and larger than those of Garabunda.

Not more than five yards to the west of these rocks, is a small double eminence, composed of albitic gneiss, similar to that of Carverà, on the little ridge of which were placed many granitic blocks, analogous to those of Guirzinghee. Looking at the direction of the masses of this porphyry, which is precisely the same as that of the pass, it is more than probable that they are the prolongation, under ground, of the same formation. The hillocks and small eminences in other parts of this plain, are either the common garnetic gneiss, or that in which the laminar felspar passes into albite; through which the porphyry at this place seems to have forced its way.

In conclusion, we may be permitted to make a few general remarks on the phenomena observed during the journey. The first is the singular fact, observed and mentioned by writers on Indian geology, Dr. Heyne among others, of the total absence of organic exuviæ in both species of kankar, which, notwithstanding the different periods of their deposition, are alike deficient in this respect.

The same remark has been made with regard to the laterite, in which no shells or other fossils have been found, either in the Indian peninsula, or on the opposite continent and adjoining islands. Such absence is more remarkable, because it is observed of two rocks, the one concretionary, the other conglomerate, which appears to indicate an origin not very ancient; and the kankar, in particular, which invests, not only the detritus and small pieces of the unstratified and stratified primitive rocks, such as granite, gneiss, hornblende, chlorite slate, actynolite schist, quartz, &c.; but also the modern ones, I mean the fossiliferous, such as mountain limestone, sandstone, basalt, &c.

The lateritic rock at Puddagarum, is the modified hæmatitic iron ore, and the conglomerate rock results from its detritus. At Nullacherla, the blocks were little above the soil, and situated in the same position as those of conglomerate sandstone, evidently forming a bed in the last mentioned rock. The third kind of laterite, that at the summit of the hill of Bimlipatam, overlaying, and imbedding fragments of, gneiss, both at the surface and near the points of contact with the subjacent rock, contains many veins of hæmatitic iron of different thickness, into which it passes in its lower part. Those blocks called laterite at Puddagarum are, evidently, in appearance, and in the circumstance of association with the hæmatitic iron ore, analogous to that of the Neilgherries; of the other two, we must be satisfied of their similitude, by induction only.

Adverting to the rarity of contorted strata in the rock prevailing in this part of India, namely, garnetic gneiss, with occasional intermixture of albite; and to their frequency in the other variety of the analogous rock, containing mica, in many other localities, we must feel anxious to inquire, what is the real cause of the difference in the forms assumed by the strata, when in a semi-consolidated state.

Along the route which we have travelled, the only two places, where I met with gneiss whose strata were contorted and undulating, were the hill of Bezoara, and that about two miles west of Cottipollium. We must not omit mentioning, that, in both places, the disturbance did not extend far; at Bezoara it occupied only one side of the hill; and in that near Cottipollium, the contortions were seen only in loose, erratic blocks, perched on the south declivity of the hill. It is necessary here to remark that, through the Bezoara strata, were seen large dykes, or beds, of greenstone, which, evidently, must have contributed greatly to the distortion of the strata.

The other variety of gneiss, containing mica, such as that in the table-land of Mysore, and elsewhere, is traversed by numerous basaltic or porphyritic dykes, the existence of which suggests a plausible reason for the disturbed strata of gneiss in that district.

Thus, suppose two enormous dykes of basalt, at a certain distance from each other, bursting through the semi-consolidated, horizontal strata of a rock, say gneiss, enclosing between them a certain extent of these strata, which, we suppose, to be under a moderate pressure from above: what will be the consequence of a force, such as that of the intruding basalt, applied on the extremities of the strata, in opposite directions?

The luminous experiment of Sir James Hall, answers satisfactorily this question. He put on a table different coloured square pieces of cloth, horizontally, one over the other, having put a board with a moderate weight on them (Pl. 17. fig. 10): *a a*, are the pieces of cloth, which, in the beginning of the experiment, were horizontal; *b* the weight; *c* the table; *d* the two pieces of board, which are made to slide on towards each other. It was found that the superincumbent weight was raised some few inches, and the horizontal pieces of cloth became distorted, like the strata of many rocks.

We must take into consideration the numerous fissures, through which the immense quantity of trap in India must have been erupted at some remote period, and of which, at present, nothing remains, except the outgoings of these gigantic dykes, on mountains, and in plains, sometimes invisible, because covered with the soil.

The mass of gneiss, which we have supposed to be enclosed, and compressed between two opposite forces, having been lifted into the atmosphere; owing to the comparatively speedier decomposition and disintegration of the basalt, which, after a time, falls away, the contorted stratified rock is left, either as a solitary block, or as an implanted mass in the detritus of the imbedding rock accumulated round it.

This must have been the case, with many of the masses of gneiss near Bangalore, Golcondapatnam, &c.; whose strata, although exceedingly disordered, yet have very little trap in their vicinity, which, however, is seen at some distance from them. After what we have stated, we may safely affirm that the frequency of intruding rocks in a formation of stratified ones, produces the contortions in these last; and that when rare, or totally absent, no disturbance in the strata is observed.

To conclude these cursory notes, we will give a brief catalogue of the principal rocks, examined during the journey, ranged according to their degree of prevalence.

1. Garnetic gneiss, the felspar sometimes changing into albite or adularia.
2. Porphyry.
3. Hornblende slate and rock.
4. Sandstone.
5. Kankar, ancient and modern.
6. Shell limestone.
7. Common granite.
8. Basalt.
9. Lateritic iron ore.
10. Sienitic granite.
11. Black soil.
12. Alluvium.

X.—*An Account of the Tribe of Mhadeo Kolies.*—*By* Captain A. Mackintosh, *27th Regiment Madras Native Infantry, Commanding Ahmudnuggur Police Corps.*

Preliminary and general observations, respecting the different tribes of Kolies, and where they are located.

Among the various classes of inhabitants, within the territory forming the Government of Bombay, the names of few are more familiar to us, than that of the tribe of Kolies—more usually written Cooly[*] by the English. They are to be found nearly in every part of Guzerat, and, in several of the districts of that province, they constitute a very large proportion of the agricultural population, and, in many instances, are most notorious robbers. They are very numerous in the Attaveessy, and there are many settled in the northern Konkan. In the hilly tract of country, lying between Moossa, south west of Poona, and the hill fort of Trimbuck, the source of the Godavery river, the inhabitants are chiefly Kolies, and a few are scattered over the districts of Candeish, Ahmudnuggur, Poona and Shollapoor, and along the Ballaghaut on the western frontier of the Hydrabad territory.

Although the information we possess of these people must be considered rather imperfect, I think we may venture to say, that, in the earlier ages, they were the only inhabitants of a portion of Guzerat and of the Attaveessy, for a part of the latter tract of country is termed by the natives Kolwun or country of the Kolies. Hills and forests, and such formidable barriers, will tend to divide communities, and local situations will not only induce new and appropriate names, but will also produce some difference in manners and habits. Notwithstanding that these people have, in the course of time, separated into different classes or minor tribes, they continue to retain the general appellation of Koly; which seems powerful evidence of their original affinity, and of their being branches of the same stock.

The following are the common designations of the different classes or castes of the tribe of Kolies; and they appear to be located nearly as here described.

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[*] On a former occasion, I ventured to derive the term *Cooly*, applied by us to porters, labourers or persons who work for hire, in the following manner—as the fishermen, boatmen, and many of the common labourers, at Bombay, and along the coast, are Kolies, the term *Cooly* may have originated among the English at Bombay. A passenger coming ashore, when a ship arrived from Europe, might have wished to give a box or package in charge to a native (probably a person of rank or caste); he would say, or a servant in attendance might say, that he would fetch a Koly, or a certain number of Kolies, to take "master's baggage" to the shore. Thus the term would have become familiar, and, in the course of time, would be indiscriminately applied to all porters or labourers, and soon have spread among the few English settled in India in those days.

The Raj Kolies reside chiefly in the Attaveessy, and in the Wunn, Dindory and Nassick Pergunnahs. A few are settled in the vicinity of Jowair, in the Konkan; they are cultivators and labourers. They worship the gods Khundobah, Bhyroo and Bhowany. They say that they have derived their name from the Koly rajahs in former ages having intermarried with their ancestors, and employed them in their service as domestics and sepoys. The Sir Naik Ballajee Buddajee resides at Wagyra, in the Nassick districts, and holds the village of Vellgaum in free gift, and enjoys several perquisites. The village, &c. was presented by the Jowair rajah to one of the Naik's ancestors. The Naik settles disputes connected with the infringement of their customs. These Kolies are sometimes called Bhen Kolies, and are said to have originally belonged to the tribe of Mhadeo Kolies, but, having committed some irregularities, they fled from their tribe and associated with Kolies of an inferior description, and at present hold no intercourse with the Mhadeo Kolies.

The Solesy Kolies are settled in the same parts of the country as the Raj Kolies; and are also cultivators and labourers. The Solesy Koly is known by the name of Lall Lunggooty Wallah Koly, and Kasthy Koly. They worship Khundoba, &c.

The Toukry Kolies are inhabitants of the Attaveessy, principally around Peint and Dhurrumpoor. Like the other Kolies some of them are cultivators and others labourers. As the term for a large bamboo is toukry, and a number of these Kolies are employed cutting down bamboos, that are afterwards conveyed to the coast and to the Dukhun for sale, it is said they derive their name from their employment. They worship Khundoba, Bhyroo, &c.

The Dhour Kolies are numerous in the Attaveessy, and a few of them are settled in the Wunn Dindory districts. They appear to be the most degraded of all the tribes, and do not hesitate to partake of the flesh of cattle that have died a natural death, and they are, at the same time, the most determined drunkards. When I was employed in the Attaveessy in 1820, this tribe was considered no better than the Dheres (pariahs) of the detachment with me. They are farmers and labourers; some of them are employed in cutting down the teak-wood within the districts of the Peint and Wassoonda rajahs, &c., which the timber merchants from the towns in the Dukhun purchase from them.

A few enterprising Parsees, who are settled in some of the largest villages on the public roads leading through the Attaveessy, supply the Kolies with abundance of arrack, distilled from the mowah flower. The Koly pays the Parsee in grain for his spirits. In many places they distil the liquor for their own consumption. These four classes seem to be one and the same people in the Attaveessy, but there appears to be some difference in the manners and habits of those residing in the Wunn Dindory districts. The Naiks adjust matters connected with the usages of their tribes.

The Doonggury Kolies.—A few of these Kolies reside in the Attaveessy and in the Wunn Dindory districts. They are farmers and labourers, and some of them are employed as the local police of the district, in the pay of government. Kolies that reside near a hilly district are termed occasionally Doonggury Kolies, from Doonggur a hill.

The Bheel Kolies are not by any means numerous. We find one or two families settled in a few of the villages along the banks of the Pera and Godavery rivers. They appear to have been runaways, who associated with the Bheels, and subsequently intermarried with them.

The Mullar Koly.—This Koly seems to be one of the most pure and respectable classes of all the tribes. They are also known by the name of Panburry Kolies, from their employment of supplying the villagers and travellers with water. They generally employ buffaloes, to carry the pukhall (leather bag), in which the water is contained. The Panburry Koly is a member of the third division of the Bulottah institution, and receives his pay in kind from the villagers for his services. It is his duty to wait on travellers in the employ of government, and strangers; to clean out and plaster (with cow-dung) the floor of the Dhurrum Jalla or Chourry (the public resting place); to supply them with water, &c. He also attends at all festivals, marriages, &c. in performance of his duty. This Koly is also termed the Choomly Koly, from a twisted piece of cloth, which he places on the crown of his head to rest his water pot on. The same Koly is frequently called the Koonm Koly, from his associating with the Koonbies or cultivators, for they occasionally partake of food at each others houses. One or more families of the Mullar Kolies are settled almost in every village in the Dukhun and in Candeish, and along the Ballaghaut in the Hydrabad territory, extending eastward to Khandhar, Indore and Boden, between the Godavery and Hydrabad; they are settled in the Ballaghaut (in a south-eastern direction) in the vicinity of Nulldroog. In many of the villages around and south of Punderpoor, this Koly holds the situation of the village Efskur, or beadle, and is consequently termed turrall. We find them occasionally employed as sepoys and village watchmen. In such villages in the southern portion of Candeish and north of the Godavery river, as the turrall (the person who performs the duty the Panburry Koly does in other parts of the country) is either of the Dhere or Bheel tribe, a Koly is engaged as his deputy to perform the service, his own low caste not admitting of his doing so. There are a few Mullar Koly Patells of villages in the Candeish and Ahmudnuggur districts. The hereditary Kolies of the hill-forts of Poorundur, Singhur, Torna and Rajghur, all south of Poona, are Mullar Kolies, their duties consisted in guarding the approaches leading to the forts, &c. They held enam lands and received regular pay from government, besides enjoying the privilege of cutting grass and firewood, &c. In the year A. D. 1340, the Singhur Koly Naik resisted the attacks of the army of the emperor Mahomed Toghluk, during several months. A few of these Kolies are settled at Bombay, and along the sea coast, as cultivators. They worship Khundobah, Bhyroo, &c.

The Aheer Koly.—The Kolies of this tribe are inhabitants of Candeish, and they reside chiefly in the villages along the banks of the Girna river, and on the southern bank of the Taptee, one and two, and sometimes five and ten, families, are found in those villages. They are very poor, but there are several instances of their holding the Patellships of villages in the vicinity of Yewull Sakry. It is said they originally came from the south. They are not held in high estimation, for they perform the hereditary duties of the turrall, or village Mhar, or Dhere (pariah), and, on this account, are entitled to receive the skins of bullocks and buffaloes that die a natural death, and they plant the horns of the animal in front of their door and worship it. The Aheer Koly is engaged occasionally to perform the duties of the jaglah, or village watchman, and at times as the Koly or water-man to supply the inhabitants and travellers with water, &c. In some villages, where the members of a family of the Aheer Kolies perform the different duties of the turrall or village beadle, those of the Koly or waterman, as well as those of the jaglah or watchman, they have been presented by the British government with from ten to fifteen, and twenty to thirty, beeghas of land in free gift, according to the size of the village, and the responsibility of the duties they had to discharge. The object of this grant, was to ensure their becoming more faithful and diligent public servants. They worship all the Hindoo deities, but the goddess Kanby Ranby (a derivative of Bhoany) is an object of great adoration with them. Their marriage ceremony is performed by a Brahman, and usually in front of the shrine of Kanby Ranby; this does away with the necessity of providing a feast for all the guests, &c., so that the expense incurred is trifling. They have two chief Naiks, who adjust matters connected with the affairs of their caste, one of these resides on the banks of the Taptee, and the other near the Girna.

The Muroy Koly performs similar duties, in every village in the northern Konkan, to those the Panburry Koly discharges in the Dukhun. He receives the Balottah allowance, and holds a piece of ground rent free, worth a few rupees. There are about a hundred families of the Muroy Koly at Bombay; they serve as palankeen bearers, labourers and porters.

The Sone Kolies are settled along the coast from Angriah's Colabah to Surat. At Bombay and Colabah (old woman's island) there are about two thousand houses of the Sone Kolies; they are all fishermen, with the exception of a few that enter as sailors on board of ships belonging to native merchants. It is said they have a dislike to going on board of vessels, owned and commanded by Europeans, in case they should lose their caste. They state that they came originally from Angriah's Colabah. They follow the profession of arms there, and do duty in the fort. Their chief men are styled Patells. The chief Patell resides at Angriah's Colabah; he possesses all the authority of the Goturany, and adjusts all disputes and irregularities connected with the infringement of the usages and rules of their caste. The chief Patell has an agent, termed Shisha (disciple), in each village or community of the Sone Kolies, who settles all disputes of a trifling nature; but, when it happens to be one of importance, it is submitted to the chief Patell Kanoojee at Colabah, for his consideration.

Such persons as are proved guilty of unchastity, are repudiated from the caste, and not re-admitted. So are such offenders as infringe their customs, and disregard the authority of the chief Patell. Occasionally a person who has behaved in a vicious and immoral manner, although he may have been rather perverse, yet, if he subsequently seems very penitent, he is received again by his kinsmen, after a large quantity of liquor has been expended, producing the inebriation of the greater portion of the assembly. In fact these Kolies seldom or never meet in any number, on occasions of congratulation, or of condolence, or for the adjustment of affairs connected with the usages and customs of their tribe, that they do not drink large quantities of spirits.

Their women, contrary to the usual customs of other Hindoo castes, wear long sleeves to their choullies, or jackets, and have glass bangles only on the left hand. At the time of their marriage, the bangles intended for the right wrist are consecrated, and cast into the sea, on which occasion the spirit of the ocean is invoked, and asked to be indulgent and kind to her husband, and to preserve her from becoming a widow, while he is traversing the deep in search of a livelihood. As a substitute for the glass bangles thus devoted, three silver ones are worn on the right wrist—several of these Kolies are said to possess great wealth. There are from five to six hundred families of the Sone Kolies settled at Bassein. Some of these serve as palankeen bearers, while those at Bombay are all fishermen. There are a good many of the Aggry Kolies settled at Bombay, Bassein, Thanna, and Punwell; also along the coast towards Surat. These people are boatmen, and serve as sailors on board of vessels belonging to natives. Some of them are palankeen bearers, cultivators and labourers. Their chief Patells settle matters connected with their caste. They worship the god Khundoba, &c.

The Mettah Kolies appear to be confined entirely to Bombay, where they have between five and six hundred houses. From residing on the hill, or rising ground, south of Mazagong, they are occasionally termed Doonggurry Kolies, from *Doonggur*, a hill. The part of the native town called Doonggurry derives its name from these Kolies, having originally been the first inhabitants, not only of that spot, but of the island of Bombay. In fact, they assert that the place belonged to them in days of yore. They are all fishermen and seamen; they do not retail the fish themselves, but hand them over to other persons in the bazar. There are persons of considerable wealth among them, who are owners of vessels that trade along the Malabar coast, navigated by sailors of their own tribe. The head Patells, Gopalljee Guary and Bheojee Soory, adjust all disputes connected with their caste. Such persons as are proved guilty of unchaste and immoral acts are expelled from the tribe, and not received back again into their community. These Kolies consume large quantities of liquor at their festivals, and convivial and ceremonial meetings. The wives of the Mettah Kolies devote the glass bangles of the right hand to the deep, to propitiate the spirit of the ocean for the sake of their husbands, in the same manner the Sone Kolies do, and they replace them with silver ones. They worship Khundoba, Bhyroo and Bhowany.

In Bombay, Thannah, Bhewndy, Kallian, Bassein, Damaun, &c. we find a people, termed by the inhabitants, the Christian, or Portuguese, Koly. It is said that their ancestors were of the tribe of Sone Kolies, and that they were forcibly converted to Christianity, some ages ago, by the Portuguese. These people are cultivators, extractors of toddy from the palm trees, and others sellers of fish. They follow the precepts of the Roman Catholic faith; but it seems an extraordinary schism has sprung up among them, or, it ought rather to be said, that some of them have forsaken the true faith, and reverted to paganism. This retrogression took place about the years 1820 and 1821, when that terrible scourge, the cholera morbus, was raging so furiously in the Konkan, and along the coast. Many of these poor ignorant creatures, seeing desolation spread in their families by this heavy visitation, thought they would be much more fortunate and happy, were they to pay their adorations to Devy, Khundoba and Wittoba, than by continuing to do so to the Almighty. A portion of them having accordingly come to this resolution, they at once abandoned the true God, and supplicated these false idols to be merciful and kind to them, and to relieve them from the distress by which they were surrounded. They have discontinued all intercourse with their Christian brethren, and resumed the custom of wearing the *sendhy*, or tuft of hair on the crown of the head. They employ Brahmans at their nuptial ceremonies, but the other Hindoo Kolies, considering them a contaminated race, hold no communication with them. A few of them are cultivators and labourers while others are sellers of fish, which they cut into small bits, and sell in their booths, or *Thanns*, in the bazar, and are therefore denominated Thankur-Kolies. A few families are settled at Bassein, Thannah, Bhewndy, &c.

There are between three and four hundred families of the Chanchhy tribe of Kolies settled at Bombay. These Kolies bear the character of being a very peaceable and industrious race. They are chiefly farmers, who cultivate various sorts of roots, fruits and vegetables, which they take to market. Others are labourers, and a few of them are employed in the service of native merchants. These Kolies come from Joonagur in Kattywar (Guzerat). They worship Dakkoorjee (Runchonjee) and Mahaluchmy.

The Kolies in Guzerat appear to be divided into several tribes—the Tullubdah, the Puttunwaria, and the Kakrez, the Dhandhour and Babbriah. The Tullubdah are the most numerous. The limits of their country extend from the Baroda district, north, to Khyralloo and Massawnah, on the banks of the river Koopyne; and from Dhollka on the borders of Kattywar to Lunawarra. Some of them are found beyond these limits, but that above defined they consider their own country. The Tullubdah, in addition to being the most numerous, is considered superior in rank to the other tribes. The Puttunwarria will partake of food prepared by the Tullubdah, but the latter will not touch food cooked by the Puttunwarria. It is a very common practice with them, to call each other by the name of the district in which they reside. The Tullubdah Kolies, residing around Kurree, &c. are known by the name of the Chowally Koly, the name of the district. The Kolies in the Mhyee Kaunta, are termed the Parriah Kolies, also the Mhyee Kaunta Kolies. Those residing in the Pergunnah of Dhygown, about 25 miles north-east of Ahmadabad, are known by the name of Kauntt Kolies. The Thakoors* of Lohar and Amlyah in this division are Kolies. The Thakoor of Goorassur, 25 miles S. E. of Ahmudabad, is a Koly of great influence; also the Koly Thakoor of Ometta on the Mhyee. The Thakoors of Agriore Kuttawun, Bhukkora, Mugoonah in the Chowall, are also Kolies. These Kolies form a very large portion of the population of the districts they reside in. It has been estimated that, in the Khaira district alone, there are nearly seventy thousand of them. They are all cultivators and labourers, and often Pâtells of villages; a few of them being employed as village watchmen, others by native bankers, &c. The Koly watchman is termed Wurttuneeah, Pujy, Pugghy* and Rukha. They hold some land rent-free, for their services, and receive other dues. Formerly, and still in many places, the Wurttuneeah is obliged to be on a good understanding with the Geerassy chiefs in their vicinity. The villagers, or the Wurttuneeah, grant a certain allowance to the Geerassy to refrain from plundering their village.

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* Rajpoots and Kolies, who are the proprietors of several villages, from which they derive a revenue of a few thousand rupees, or who have an income of a similar amount from revenue and other sources, such as geerass or grass, equivalent to black mail, are termed Thakoors.

In almost every second, third or fourth village, there are two or three families, known by the name of the Kotewallaha Kolies. They attend on travellers, particularly the government servants, to procure such articles for them as they may require. They get the potter to fetch water. In all the towns there are a few Kolies termed Selottah. These are employed by native bankers in escorting treasure, or other valuables, and they accompany travellers, from stage to stage, for a fixed allowance. Should the Selottah be at enmity with any of his tribe, he will take a sufficient number of his kinsmen with him to protect his charge. When there is danger, the Selottah boldly steps out to face it, and often has sacrificed his life in defence of his charge, and in the performance of his duty. Some years ago, the Selottah's services were eagerly sought after; they at present attend in expectation of being employed, without being called. In some parts of the country the Koly and Rajpoot Thakoors employ some of their dependants to discharge the duties of the Selottah, in escorting property and travellers through their villages.

In every ten or fifteen villages, there is a Koly named the Nathy Patelliah, whose duty it is to adjust any disputes connected with the infringement of the usages of the tribe. The Nathy Patelliah summons any offender before him, and several Koly Patells, and a few elders of the tribe, investigate the affair and fine the delinquent. He is made to furnish an entertainment for a portion of the tribe, and to pay some money, according to his means. When he has partaken of food, from the same platter with the Nathy Patelliah and some of the others, and has smoked a hooka, of which several of the assembly have also taken a whiff, he is considered to have been readmitted into his caste.

They worship Mhadeo, Bhoany, Ambyka, Devy, Botcherra Devy (Mattah) and Runchore (Krishen) and Hunooman. Of all these, Bocherra, or Betchurra, the goddess who presides over the small pox, seems to meet with the greatest attention from these people. The most sacred and binding of their oaths is that taken when the hand is placed on this idol. Another most binding mode of pledging their faith, is filling a brass or copper cup with water, placing their hands on it, and repeating the names of all their gods—this they term Pruvopyah.

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* The Pugghy is well known as the watchman employed by the officers stationed in Guzerat. He takes his name from tracking the foot marks (*pug*—a foot). They are very expert in their profession.

When any serious quarrel or feud has been settled between these Kolies, they seal their reconciliation by drinking some Koossomb, which is merely a little opium dissolved in water. They are partial to opium, and very fond of spiritous liquors. They are enterprising, bold and most desperate thieves and plunderers; yet they seldom commit murder, unless they are attacked, or resistance is offered to them.

The Puttunwarriah Kolies reside in the district around Puttun, and between the Surrasswutty and Bunnass rivers. I have mentioned before that they do not rank so high as the Tullubdah Kolies; this is on account of their partaking of the flesh of buffaloes. They are dispersed over the southern districts of Guzerat, to the vicinity of the Nurbudah, and in many places are numerous. They are cultivators and labourers, and occasionally employed as watchmen of villages, &c. They worship the same gods as the Tullubdahs, and differ little from them in respect to character. The Kakrez Kolies inhabit the district of that name, to the north west of the Bunnass river. They are numerous, and are bold and enterprising plunderers. The Dhandhar Kolies reside in the district of that name, of which Phanlanpoor is the chief town. They are a daring and wild people. The Bubbriah Kolies occupy the southern portion of the peninsula of Kattywar.

The tract occupied by the Mhadeo Kolies and their origin.

In the following pages, I purpose giving an account of the tribe of Mhadeo Kolies, who reside in the valleys on the east side of the Syhadry range of mountains, extending from Moossa, south-west of Poona, northward to Trimbuck, the source of the Godavery river, and lying between the 18½° and the 20° degrees of north latitude, and 73½ and 74 east longitude.

These small valleys are formed by masses or groups of rugged hills, and less lofty ranges, that diverge laterally in an easterly direction from the main chain of mountains, and are known to the inhabitants by the names of Mawills, Khorahs, Nahirs and Dougs—that is, valleys, glens, straths and wilds. They vary considerably in configuration and extent, and, at the distance of ten, fifteen, and twenty miles from the crest of the Syhadry range, they gradually expand into the spacious plains of the Dukhun, when the collateral branches and groups of hills, within the before defined limits, may be said to terminate, with the exception of the low, irregular branch, that protrudes from the north of Joonere, and runs along to the south of the Moolla river, but diverges much in its advance to Ahmudnuggur, after which it stretches, in a south-east direction, and ultimately constitutes the Balaghaut of the western boundary of the Hydrabad territory. The chief gorges, or passes, in the principal range, leading down from the Dukhan to the Konkan, and the bottom of the different valleys, may average from 1,800 and 2,000 feet, to 2,300 feet, above the level of the sea; and the most elevated points in the main range may vary from 4,000 feet to 4500 feet. However, the summit of the Kullsabaie hill, one of the detached branches, only a few miles from the forts of Allung and Koorung, rises to the height of 5,000 feet, and is considered the highest land in the Dukhan. Many of these lofty, isolated and rocky hills, were selected by the rulers of the country, some centuries ago, as fit places to be converted into fortresses; and, as the sides of the hills were in general very steep, indeed often quite perpendicular, it was only necessary to erect a gateway, and fortify this entrance, to render the place almost impregnable.

These numerous hill forts,* with a few solitary exceptions, have been dismantled by the British government, as they were considered, in a political point of view, useless and expensive. The original object of establishing such strongholds might have been twofold. First, the cost of fortifying such places must have been comparatively very small. Hills, suitable for the purpose, in the vicinity of large, open towns or villages, were fortified, to afford the inhabitants an asylum to retire to, should a formidable body of plunderers threaten to overrun the country—secondly, the object of erecting some of the hills of a mountainous tract into fortresses, might have been to guard passes leading from one province into another, or to overawe the population; for we know that the inhabitants of a hilly country are a very independent and untractable people.

The inhabitants of many of the villages in these valleys suffer very great inconvenience, during the months of April and May, from the great scarcity of water—yet the fortified hills were supplied abundantly with the finest description of this necessary of life. Tanks or reservoirs were excavated in the rocky summits of the hills, where the appearance indicated the presence of water; in these excavations, it frequently becomes necessary to form a portion of the rock into pillars, to support the roof of the tank.

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* As I was employed, after the termination of the last Maharatta war, in dismantling the hill forts, I can bear testimony to the general salubrity of many of these lofty dwellings, notwithstanding their very bleak and dreary situation, especially during the monsoon, when that terrible scourge, the cholera, was spreading desolation in the villages, in the plains below the forts, and more particularly those situated in low and confined situations. In the years 1818 and 1819 I had charge of five hundred *Sibundies* (irregular troops), stationed in hill forts; of this body, only two men of the garrison of Anky Tanky died of cholera. A party of *Sibundies*, stationed at that fort, went to a village in the vicinity to procure some supplies; they slept below one night, and, in the course of three days, the men alluded to were seized with the disease and expired. I may add that, out of two hundred workmen, employed in destroying the forts, about twenty of them slept below in the plain, as their families had joined them; while all the others slept under trees on the hill, or in caves. The cholera on one occasion attacked several of those that remained below, and one of them fell a victim to it.

It is to be noticed, that the acclivity, on the western side of the Syhadry range, is always abrupt and very steep. Here, especially, as well as among some of the other groups of hills, there are many grand chasms, with rocky walls, several hundred feet in depth. In these immense ravines, on the summits of the hills, and puthars, or plateaux, there are numerous plants, shrubs and beautiful trees. In many places, in hollows, and on the puthars, there are dense and extensive patches of lofty jungle and forest timber, with thickets of impervious brushwood, particularly south-west of Joonere and around Ambygoun. A variety of wild animals inhabit these jungles. Tigers, cheetahs, hyænas, bears, wild cats, hogs, kollussnahs (wild dogs),* jackalls, gowahs (bison), samburs, neelgaie, spotted deer, antelope, bhekkur, monkies; also hares, pea fowl and jungle fowls, with many birds, small and large, of rare and variegated plumage.

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* The animal, termed by us the wild dog, is known to the natives by the name of kollussnah, kollusra and kollussa. It is common in the Kotool district, and all along the range of western ghauts. It is about the size of a panther, with very powerful fore quarters, narrow tapering loins, black and pointed muzzle, and small erect ears. The tail is long, and at the extremity there is a bunch of hair several inches in length. The kollussnah is of a darkish red colour, possesses great speed and hunts in packs of five, eight, fifteen, and even to the number of twenty-five; is extremely active, artful, and cunning in mastering his prey. It is during the night time they move about in search of food, but, should an animal approach near them, an hour or two after sunrise, or a short time before sunset, they will attack it—all animals seem instinctively to dread them. During the daytime they remain quiet in their hiding places. When the kollussnah discovers an animal worthy of being captured, the circumstance is announced to the pack by a barking, whistling noise; the others are on the alert, advance rapidly and post themselves slyly round the spot, and gradually close in on the animal. Upon seeing one or two of the kollussnahs he gets frightened, but much more so when, running away at speed, he encounters one of his enemies in whichever direction he attempts to escape. The consequence is, that he stands quite amazed--some of the kollussnahs run in close to him, and shed water on their bushy tails, which they swing about and jerk into his eyes; he is successively saluted in the same manner, when he approaches them, or they run in on him. The unlucky beast is soon blinded by the peculiar escharotic quality of the application; for he begins to stagger and run round and round, and is now beset by all the kollussnahs who make a loud barking and snapping noise while they pull the animal down and tear him to pieces. When few in number, they have been known to gratify their hunger before the poor animal fell down or expired, each of them tearing away a mouthful while the animal remained standing. There are very few instances of their ever having attacked the villagers' cattle, but they will kill stray calves if they fall in with them. The Kolies never molest the kollussnah, in fact they are glad to see them in their neighbourhood, being aware of the enmity that exists between them and the tiger, for they kill that animal occasionally; and in consequence they are considered by the people as the protectors of their cattle and their fields, for neither sambur, deer, or hog, seem disposed to approach places much frequented by the kollussnah. They hunt and kill the sambur, neelgaie, hyæna, deer, jackalls, hares, hogs, bears, porcupines and quails. They killed a tiger, in June, last year, in the Teloongun jungles.

Exclusive of the principal passes in the western ghauts, there are numerous foot paths, leading over the mountains, from the Koly habitations above, to the villages below in the Konkan. These paths are very intricate, and it is with much difficulty the people travel along them when loaded, and proceeding with the produce of their fields to the bazars on market days; where the rock is very precipitous they use a simple bamboo ladder,* which enables them to effect their passage by the most direct routes.

During the south-west monsoon, which in general sets in about the end of May, or first fortnight in June, on such days as the rain ceases, not only the summit of the mountains, but the valleys are enveloped in general in a very dense fog, consequently there is always a damp and chilly sensation in the atmosphere at this period. While the months of April and May are often extremely sultry and oppressive below, it is comparatively cool on the tops of the hills. It may be observed, that the scale of the atmospherical heat, as indicated by our thermometers at times in such situations, is an imperfect measure of sensible heat. The climate is unhealthy, after the termination of the monsoon, and the inhabitants suffer much from fever and ague in the months of September, October and November.

The population of the tract just described consists of Thakoors,† some Hutgur and Telwur Kanarahs, and a few Bunjaries, in addition to the Kolies;‡ including also, some Koonbies, who have intruded themselves within a few ages past.

The following is given as the popular tale of the origin of the Kolies. After the death of one of the rajahs of the race of the sun, named Rajah Venn, who was a very great sinner and a very disreputable person (an account of him is given in the Bhugwutta Pooran), a man of a dwarfish size, sprung from his left arm, and he was called Neeshad (base born), and directed by some saint to take up his residence among mountains and forests. He, consequently, was the ancestor of all Keerauts,§ or the barbarous and savage people who inhabit wild places, and subsist by the chase. One of the descendants of Neeshad and a female shoodur, were the parents of the Poolkuss; and a male of the Neeshad lineage and a female of the Poolkuss family, were the parents of the Koly. He was to subsist, by killing whatever animals he encountered in the jungles and forests. It may further be stated, that the Kolies say that they are the descendants of Valmik, the distinguished author of the Ramayun, who, although of Brahman parentage, and born at Veer Walla, twenty-four miles south-east of Poona, it is said followed the life of a Koly. The description of Valmik magnifies him into a huge giant, who could walk fifty miles in less than half an hour. He is reputed to have been a most desperate and remorseless robber and murderer, and that he continued so until he encountered the holy Narud, who ultimately succeeded in persuading him to abandon the wicked life he was leading, for a better and more virtuous one. The Mandur Soombah ghaut, ten miles north of Ahmudnuggur, and close to that beautiful and romantic spot known to us by the name of the happy valley, is said to have been one of his favourite haunts.

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* They place a substantial bamboo, divested of its branches, except a small stump that is left at each joint or division, to be used as a step.

† A short account of these people will be communicated in a separate paper hereafter.

‡ There are some Mhadeo Kolies settled around Jowair in the Konkan; the Rajah of Jowair is a Koly. There are some of the same tribe in Bombay.

§ Keeraut, Poolinda and Shubbur, are the Sanskrit terms applied to the Bheels, and other wild hilly tribes.

The Sanskrit word *kywurtuk*, meaning—boatman and fisherman, is applied by some of the* inhabitants to the Kolies, but in the Dukhun it is unusual to see them engaged as boatmen. A very few of them, from necessity, may in some places follow the profession, for a month or for a season; as the Koonbies, Mallies, Bhooies, Dheres and Mahomedans do. Neither is it common for the Kolies in Guzerat to labour as boatmen. The term might be more appositely applied to the Kolies along the sea coast.

There are several hundred families of the Dhewur tribe of boatmen, settled in the towns and villages on the banks of the Godavery river, between Nassik and Gungakhere. They state that their ancestors came from Bundlekund in Hindoostan. They worship the god Ramah, and relate a miraculous story respecting their own origin. They say that they are not Kolies; the terms Dhewur and Kywurtuk are synonimous, and the Poorans state that they are the offspring of a Pursovah, a goldsmith and an Eeogvhy or female patruwut (a hewer of stones), who are to be employed as boatmen at ferries on large rivers. A few of them are employed at Ahmudnuggur and Poona as palankeen bearers.

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* The Mahomedans and a great many of the Hindoos are very apt to apply the term Koly to persons of various low tribes, respecting whose origin and habits they may be ignorant. There is a class of people, known by the name of Tarroo, who are boatmen at the ferries of the Godavery, &c. and, although they are quite a distinct class, and not very numerous, some persons ignorantly call them Kolies. In the country to the north and to the west of Hydrabad, there are several tribes of low caste people, who resemble the Kolies in some respects. One of the most numerous of these are the people known by the name of Mootrassy. When they cultivate and work as labourers they are so called; those who superintend water courses and tanks, to see the regulated quantity of water supplied to the people, are termed Neerrorrahs; and those who follow a military life are called Tellgolls, which is the familiar word among them for an armed man. The Tellgolls, are much employed as sepoys (hereditary) in the service of the Naiks or Zumeendars, in the Hydrabad territory, and they hold a considerable portion of land rent-free for their service, which is cultivated by some of the family. Besides they receive dues from the inhabitants, for performing the police duties of villages, and are employed in collecting the revenue and on "field service" when the Naik is engaged in hostilities, even should it be with the ruling authority of the country; on which occasions the Tellgolls were frequently in the habit of sending their families to the jungles for protection, while they showed the greatest zeal and most devoted attachment in the Naik's cause. Some of these people were formerly employed in the Poona subsidiary force, as pioneers, lascars and dooly bearers. A few of them are settled at Poona and Seroor as palankeen bearers. The Mootrassy passes under the denomination of Kamatty, at Poona and Seroor. The word Kamatty is applied, by the inhabitants of the Mahratta country, to all descriptions of persons coming from the Ballaghaut and the Hydrabad country who can speak Telingy, Koonbies, Mallies, &c. and even Mahomedans, are classed under the head of Kamatty. The Mahomedans in the country around Commummait, Nullgoonda, Pochumchilloo, apply the term Koly to the Tellgolls. They worship all the Hindoo gods under the Telingy names of Eerranah (Mhadeo) Ellamah (Bhoany), Pochumah (Matta Devy); but their chief object of adoration is Narasingha, the man lion, being the fourth Avatar of Vishnoo.

The tribe of Mhadeo Kolies is divided into twenty four Kools, or grand division; each of these is subdivided into branches or classes, amounting in all at present to about two hundred and eighty. Each of these clans comprises many families, bearing the same surname; the number varies according to circumstances.

The following are the names of the Kools of the Mhadeo tribe of Kolies, with the number of clans or branches that have diverged from each:

	Clans.		Clans.
The Wunuckpall, from this have sprung	17	The Polewoss, from this have sprung	12
The Kudum	16	The Ottarracha	13
The Puwar	13	The Dulvy	14
The Keddar	15	The Goully	2
The Boodywunt	17	The Agghassy	3
The Namdeo	15	The Chowan	2
The Kheersagur	15	The Oojajy	12
The Bhagghywunt	14	The Sagur	12
The Bhonsla	14	The Shaikacha Shesha	12
The Jugtap	13	The Khurad	11
The Gykwar	12	The Seerkhy	2
The Sooryvaunssy	16	The Sew	9

Although it is impossible to ascertain who the original founders of each Kool or grand division might have been, we are, however, supported by traditionary evidence in stating, that persons of rank or influence in former ages, who might, from necessity, choice or other causes, have joined the Koly community, occasionally became, in such case, the founder of a new Kool. As a proof of this, it may be mentioned here, that the origin of the Lokkriah and Garriah clans of Kolies, who are numerous in the Ghore Nahur or valley of the Ghore river, is popularly accounted for in the following manner. A person named Batty Row Sirkhay (styled Rajah, and said to be connected with some of the powerful families of the name in the Dukhun), having been afflicted with a very terrible and most loathsome disease, repaired to the celebrated temple of the deity Wittoba at Punderpoor, and implored the god to remove the terrible disease and restore him to health. The deity is said to have listened to his earnest entreaties, and recommended him to proceed along the banks of the Bheema, until he reached the temple of Mhadeo at Bheema Shunker, the source of the river; and that, if he paid his devotions deligently at the shrine of Mhadeo at that place, he might expect to find that the deity would restore him to perfect health. He accordingly commenced his journey towards the western ghauts. The jungles or forests in the vicinity were, in those days, almost impervious; however, Sirkhiah gradually advanced, and, when he had approached the hill near the temple, he discovered a cave, in which an old Koly and his daughter resided; he made up to this Koleen while her father was absent at the temple, and learnt from her that her father was the attendant of the temple of Mhadeo. However, to cut the story short, Sirkhiah recovered his wonted health, and became enamoured of the Koleen, who, in the course of time, presented him with a boy, and as the child had an unusual quantity of hair on his body, he was nicknamed Lokhriah, which, in the Mahratta language, means hairy. Tradition further says, that Sirkhiah invited many of his relations and friends to join him, and that he founded the village of Shawpoor; but, as he subsequently became a bold and daring plunderer, orders were given for apprehending him, and in an attempt to capture him he was killed. His son is supposed to have been the founder of the clan Lokkriah. The Sawunt Desmooks in Bhaumnhair have a copy of a document, dated Anno Hijera 827, corresponding with A. D. 1423, in which the services of one of their ancestors are commended by the king of Bedur, for having suppressed an insurrection caused by Batty Row Sirkhy, on which occasion the village of Irum was conferred on him in enam (free gift), and he was confirmed in the Desmooky of 84 villages. The descendants of Sawunt continue to enjoy these grants.

Were we to judge from the similarity, some of the names of the twenty four Kools bear to the present Koonby surnames, we might feel inclined to conclude that the Kudum, Gykwar, Puwar, Jugtap, &c. were apostate Koonbies who had joined the Kolies: but then it is to be recollected that these surnames are common to all the families of the very lowest classes of the community. The Chowan Kool is thought to be of Rajapoot origin, and the Namdeo Kool, it is conjectured, must have been founded by one of the Mahratee Namdeo Simpees, or tailors, as they are the only Kolies who abstain from killing sheep at their weddings, following the example of the Namdeo Simpees in this respect, who do not partake of animal food during the nuptial ceremonies, although they offer propitiatory sacrifices to their gods, some days previously. One of the members of the Memmy family of the Kheersagur Kool, who are Patells of the village of Kheeryear, in Mherr Khora, some four or five generations back, received a Bunjara boy into his family, and adopted him as his son, the boy taking the name of Memany. This circumstance has been the cause of much strife and quarrelling among the members of the family, the descendants of the Bunjara claiming the Patellship, while the lineal descendants deny their right, and upbraid them with the nature of their origin.

It appears that nineteen of the original names of the persons who were the founders of the different Kools of this tribe, have in the course of time become extinct: yet the numerous clans who have respectively sprung from each of them, carefully retain and cherish the name of their original founder. The Mhadeo Kolies are peculiarly tenacious of the Hindoo usages, of adhering strictly to established rule in forming their matrimonial connexions. For it is only persons of different Kools that can be united in marriage. Those of the same Kool, or original family stock, are prohibited intermarrying. It is a common observation, that, were persons of the same Kool to marry, the circumstance would entail much unhappiness and misery on the parties, and that their offspring would never thrive. I know an instance of such an irregular marriage, and it is rumoured that the couple are very unhappy and have no children. The mistake occurred by the parties omitting to institute the necessary enquiries at the proper time.

The estimated number of the tribe—their Patells--the Revenue system, and grains cultivated by them.

It is said, the Kolies were much more numerous about seventy years ago than they are at present; that many of them were destroyed during the various disturbances that have taken place since then, and by the famine that occurred in 1803-4, and, latterly, by the cholera morbus. To afford a better idea of the amount of the Koly population at present, and to show how they are dispersed over the hilly tract, I will give the estimated number of their houses in each valley and glen.

There is reason to suppose that they were more numerous in former times, around Poona and the valleys south of Loghur fort. But, in the valley of the Moossa Khora, they have only thirty houses, and in the Mootah Khora they have also thirty houses, and forty in the Puwun Mawill; all of these are Oopry* cultivators and labourers, there being no Koly Thullkuries or Wuttundars so far south at present.

In the Andur Mawill there are sixty Koly houses; they are the Patells of two villages and share the Patellship of two others with the Koonbies.

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* Oopry—a tenant, or one having no property in the soil; whereas Thullkury means one that has a right in the lands he cultivates.

In the Nana Mawill the Kolies have a hundred houses, they hold a share of the Patellship of several villages, and the Heemarrah Koly Naik, with ten men, is employed in the police.

In the Bhaum Nahir the Kolies have 45 houses, and they hold a share of the Patellship of two villages; but the Koonbies, who hold the other, are in a fair way of gaining the entire power, by forcing the Kolies from their houses. Much intriguing, and a great deal of villany, is often exercised among these people on such occasions. The Mettull clan of the Kedar Kool is the most common in this strath. The Kolies residing in four villages in the Koorah Barrah and Arrull Khorah have about 85 houses; they hold half the share of the Patellship of two villages, the Koonbies hold the other. It is said that it is only very lately the Koonbies have unjustly secured the share of the Patellship for themselves. The Koonby, who now holds the Patellship of Kheirpoor, is a nephew of the Desmook of the district; he only took up his residence in the village a short time ago, for the purpose of grazing his cattle in the adjoining jungles. Although the title and a share of the office of Patell was conferred upon him, no enam land could be granted without the sanction of the government authorities; however, as the village Chougla died without any heir, the Desmook transferred his enam land to the new Koonby Patell. The Parday clan of the Gykwar Kool is the most numerous in this glen.

In Bheem Nahir, the Kolies are the only inhabitants of nine small villages, and in nine other villages they and the Koonbies hold each a share of the Patellship, the Koonby Patell takes the precedence of the Koly Patell in all the village affairs, which is a source of great vexation and complaint to the Kolies, as they declare the Koonbies have unjustly taken possession of these situations. The number of Koly houses here is estimated at 288, and the names of the Langly, Murkhy and Nanggry families are the most numerous.

In the Ghore Nahir, or valley of the Ghore river, and in the Ambygown quarter, there is a great deal of jungle. The Kolies are more numerous here; in forty villages they have nearly one thousand houses; and hold the entire Patellship of 35 villages and share that of five others with the Koonbies. The Koonby Patell's share of the village of Wuspah was purchased, only a few years ago, from the Koly Abbajee Singgariah, for the small sum of forty rupees. The Koly was involved in difficulties; his property had been distrained, to pay arrears of revenue; and, to get rid of his debt, he was persuaded to sell his share of the Patellship. The Koonby Patells of this quarter are constantly exerting themselves to dispossess the Koly Patells of their rights. This leads to incessant strife between the parties. The Koonbies using their influence with the Desmook and Koolkurny to get them either for love or money to support the claims they put forth.

Three very small villages have been deserted in this quarter, within these last six years. In two of these there were only a very few inhabitants, and, as they had suffered much from sickness, they quitted the place. The third was deserted owing to a boundary dispute not having been satisfactorily adjusted. In the quarter called Ghora of this valley, there are one hundred Koly houses in six villages, and in one village they continue to retain a share of the Patellship.

The Koly Naik, Dada Baumlay of Bhoregur, is employed in the police with twenty-five Kolies. They have charge of the valleys, of the Ghore, the Bhaum and the Bheema rivers. The Naik's pay is 25 Rupees per mensem; the men receive four rupees each. The Lokkriah, Assaully and Bendery clans are the most numerous in this valley. In Meen Nahir there are 321 Koly houses in 17 villages. The Kolies hold the entire Patellship of eleven of these—the Patellship of five others they share with the Koonbies, and of one with a Mussulman. These are constantly squabbling, and claiming precedence of each other. The most common family names in this strath are the Neegly, Silkunda, Ballcheem, Borrorry, &c. In the Kookur Nahir the Kolies are the sole Patells of thirteen villages, and they share that of eight with the Koonbies. The number of their houses amounts to 316. The Toory Koly, Patell of Tejoor, and the Koonby Patell Khurrad, are always quarrelling. The Koonby is accused of having come to the village jungle to graze his cattle, and, by unfair means, to have usurped a share of the Patellship. The Sablah, Naggry, Dewtah, &c. are the most common family names in this strath.

Mhurr Khora.—The Kolies are the only inhabitants of five of these villages of which they are the Patells; in four of the other villages there are a good many Koonbies, but the Kolies are the Patells, with the exception of one, which they share with the Koonbies. In the village of Peeplegown the Koonby Jumdurry is the sole Patell. The family of Bhokkur, notorious among the Kolies as being one of their greatest chieftains, was Patell of this place, and resided here. It is known by the name of Peeplegown Bhokkur. It is said that the Bhokkur Naik fled, during an insurrection of the Kolies, when Nana Phurnavees was minister; and that the ancestor of the present Koonby Patell contrived then to secure the situation for himself. The present Koly Naik continues to claim the Patellship. There are 164 Koly houses in this glen.

The Bhokkur Koly, Naik of Mhurr Khora, with 25 Kolies has charge of the police of Meen Nahir, Kookur Nahir and Mhurr Khora.

In the Oottoor quarter the Kolies are the sole occupiers of ten villages, of which they are the Patells, and they share the Patellship of twelve others with the Koonbies. In the 22 villages there are 394 Koly houses. Diggy Mally and Gondky are the most common family names.

In the Kotool Dang there are 840 Koly houses in 32 villages, and they are the Patells of 29 villages. In the Kotool puthar (plateau) and adjoining villages, there are 200 Koly houses. Between the Singgally Koly, Patell of Wanjoollsett, and a Telwur Kanara, who has claimed the Patellship for these 35 or 40 years, much enmity exists. The Koly's corn and sugar cane fields were lately destroyed by the Kanara's cattle. The latter has a little money, and bribes the Zumeendars, and by this means retains possession of the office he has usurped.

In all there are about 1,040 houses. Bhauggrah, Moottah and Heelah are the most common family names. Ballajee Bhauggrah of Khona, the hereditary Koly Naik of the hill fort of Koonjurgur, was appointed to the police of the Kotool districts, with ten men, a few years ago. He shortly afterwards died, and although his son ought to have succeeded him, as the Naik Rukwulldar of the district, another, but more wealthy, clansman, by means of bribing the Brahman agents, got confirmed in the appointment, to his detriment, and he is constantly complaining of the injustice done to him.

In the Rajoor Dang, the Kolies inhabit 36 villages, and they hold the Patellship of 35 of these, and share that of the Kusbah of Rajoor (the market town) with the Bunjarrahs, who are settled there. Much strife and bad feeling exist between the two parties, owing to the rivalship between them about taking the precedence at festivals, and in other affairs connected with the village duties. The Desmook of this district is a Koly (the family intermarry with the Rajahs of Jowair) the surname Peechur, and the Bhauggrah family of Ekdurrah have been the Naikwarries for ages past. The present Koly Naik, Gungojee Bhauggrah, communicated information to me of a most important nature, relative to the movements of the rebel Kolies some years ago, for which he was handsomely rewarded by government. The number of Koly houses is estimated at 992. Bhauggrah, Peechur, Kudally, &c. are the most common names in the district.

The police of Rajoor and Malldesh is in the charge of the Koly Munsubdar Naik, Jowjee Baumlay, who has forty men under him; and the Sir Naik Bhauggrah of Sakurwary with twenty five; and the Khary Naik of Barrah with fifteen men.

In the twelve villages of Putta (under the forts of Ounda Putta) the number of Kolies' houses is about 163, and they hold the Patellship of six villages. The most common family names are the Tullparah, Duglah and Sablah.

The cattle, in the villages of the tract around the forts of Ounda Putta, are all singularly marked, being invariably spotted white and black, red and white, or black and red. *Ounda Putta* means marks reversed, or upside down.

In Malldesh, the Kolies inhabit three villages of the Takeed Khora, of which they are the Patells; and they hold half the Patellship of two others. They have 269 houses in this glen.

In the Kounnaee Khora, the Kolies have 200 houses; they hold the entire Patellship of seven villages, and share that of another with the Thakoors. Amby Mohur rice, of a superior kind, is grown here. The surnames, Perrykur, Khuttelah, and Gubbalah are the most common.

In the Dharrun Khora the Kolies are the Patells of five villages, and hold half of that of another; they have 262 houses here.

In the Oondhwole Khora the Koly houses amount to about 217. They share the Patellship of six villages with the Koonbies. The two parties are constantly quarrelling about their rights in these six villages. It is said the Kolies were the sole proprietors of these Patellships some sixty or seventy years ago.

To the south of the hill fort of Trimbuk, in 14 villages, the Koly houses amount to 228. They are the sole Patells of eight villages. They share the Patellship of two others with the Thakoors, and one with the Telwur Kanarahs—surnames Gondky and Wagh.

In the town of Trimbuk and neighbouring villages, there are about 250 Koly houses of the Mhadeo tribe. Here some families of the Koly tribes from the northward are settled.

In the town of Nassik and its vicinity, there are about 200 houses of the Mhadeo Kolies, and, in and around the town of Sinnure, about one hundred, and about one hundred more settled in and around the town of Ankollah. In the Konkan, but chiefly in the Jowair district, there may be about 2,500 houses, and it is supposed that the Mhadeo Kolies, who are settled in Bombay as labourers, &c. have about one thousand houses there.

From the above we find that there are in the Dukhun about..	6,895
In the Konkan and Bombay..........................	3,500
In all about houses......................	10,395

As two and three families reside frequently in the same house, if we take the average number at five for each, it will give us upwards of fifty thousand souls of this tribe.

The Koly Patell, or the chief person of the village community, has to perform the same duties in their small villages and hamlets, that the same officer has to execute in other parts of the country. They have to lend their assistance in collecting the revenue and other dues from the inhabitants of their villages, and to aid the police in their magisterial capacity. For the performance of this duty the government remunerate them by granting them a portion of rent-free land, termed

Passoury,[*] which varies in quantity, from about 100 begahs, to half, a third or a quarter of that number, according to the size of the village and supposed responsibility of the Patell. He also holds a portion of Meerassy-land for which he pays rent.

From the inhabitants he receives the following perquisites or dues. Every householder presents him with one fowl annually, and every farmer gives him one seer of ghee; if the farmer is very poor, the Patell will be content with a half or quarter seer. Each farmer presents the Wannolla (a sort of friendly offering) at the harvest time; this is a little of the produce of his fields, which may be about a paillie, or four seers. Should the farmer have a large quantity of rice, nagly and koorachny, the Patell will take about four seers of each, and one or two seers of any other grain he may have grown.

In such villages or kushbahs, where fairs or markets are held, once or twice a week, the Patell is entitled to a small quantity of the vegetables and fruits brought for sale. From the venders of uttur (essence of roses, &c.) the Patell occasionally claims a narrapoorah; this is a small packet containing a little koonkoo, missy, abheer, hul'd, goolloll, and frankincence, each tied up separately. This is brought into requisition after the birth of a child, when the mother takes the packet to the temple of Sutwaie,[†] when it is placed before the shrine of the goddess, along with the offerings, and she is invoked to bestow her favour on the infant. If there is a bunniah (a grocer) in the village, he presents one soopary (nut) and a little tobacco daily to the Patell, but he has to send for them. He also receives one seer of coarse sugar at the Dussera, Hooly, Dewally, and a few other festivals.

The Patell's rank entitles him to the Maun or precedence at all public ceremonies connected with their customs and habits. If there be a mochy in the village, he must present the Patell with a pair of shoes annually at the Dussera. On the occasion of a marriage, or the naming of a child, the Patell receives a soopary (nut). When sacrificing the sheep at the Dussera he begins the ceremony. Also in the month of Jesth, when the villagers kill a young buffalo, to propitiate Bhoany, the Patell goes through the ceremony of wounding the animal slightly (in any part of the body) with his sword. He is entitled to certain services from the village Mhars.

The Desmook of the district enjoys a few begahs of land-rent free, and receives a Bheut rupee from each village in his district, besides he manages to get an additional rupee from each, as a substitute for a Passoury, which he solicits the people to give him. One seer of ghee and a fowl is also presented to him annually by each village, as well as the Wannolla of rice varying from four to sixteen seers, according to the size of the place. The Desmook receives from government three per cent. on the revenue of each village. The Desmook sends a sepoy to the different villages for these articles, and they are transported to his house by the village Mhars.

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[*] Passoury means two pieces of cloth that are stitched together at the sides, and then doubled over, and stitched all round, and is used as a wrapper.

[†] The goddess that presides over childbirth.

The Desmooks originally were the hereditary collectors of the revenue of their respective districts, which they paid into the government treasuries—owing however to their great dishonesty, and having been guilty of embezzlement, and corruption in the performance of their duties, they do not appear to have been employed in the fiscal department for a very great number of years. As they are in general very intelligent persons, and possess much influence in their districts, I suggested to government, about six years ago, the advantages likely to arise from engaging their services to some extent in aiding the police of their districts, thinking them fit instruments to be employed in assisting the government agents in maintaining the tranquillity of the parts of the country in which they resided, to prevent gang robberies, &c. Lately, they have been called upon to communicate information respecting the state of cultivation in their districts, and to encourage the extension of it.

The Naikwary of Rajoor.—This office has been held, for many generations, by the Bhauggrah Koly family of Ekdurrah. This appointment was instituted for the purpose of watching the agricultural interests of the district. The Naikwary was constantly on the move, visiting every village within his range, and seeing that the cultivation was not neglected. If any of the cultivators were unable to carry on their farm, having lost their bullocks or incurred any heavy loss or expense, the Naikwary obtained an advance of money for their use from the government, or in some other way enabled them to go on with their labours. If a cultivator absconded, owing to his having been oppressed by the Patell or other persons, the Naikwary had to discover the place of his retreat; and it became his duty to bring him back to his village, and to settle any quarrel that might have existed between him and any of the villagers; the Naikwary warned the Patell against his behaving ill towards this man, and he explained to the villagers that if, in consequence of their threatening or maltreating him, he absconded a second time, the inhabitants would be obliged to make up the loss by paying the rent of his fields to government.

Should the man have absconded to escape paying his rent to government, the Naikwary went in search of him and persuaded him to return to his village. The Naikwary, accompanied by the Desmook, the Despondiah and the Koolkurny, also by the absconder, then proceeded to the Soobahdars, when the Naikwary explained matters, and became security for the good conduct of the absconder. The Naikwary had to report to the government authorities all irregular conduct on the part of the Patells, and others towards this man after his return to his village.

The Naikwary's perquisites consisted of from 16 to 24 seers of grain from each village according to its size; also a seer of ghee, a fowl and one rupee in cash. The Naikwary's services are dispensed with at present, and they no longer receive the dues of their office; some of them occasionally endeavour to levy a few annas or a rupee from the people.

The Koolkurnies (the village registrar or notary) and Despondiahs (the district record keeper) being Brahmans, there is little occasion to say much about them. They exact in some places a seer of grain for every rupee of revenue paid to government; also a seer of ghee and a rupee on account of stationery, from each village. The Despondiah and the Koolkurny receive 2½ per cent. on the amount of revenue collected annually. These men, having charge of the village allowances, deducted from the revenue for discharging the various public expenses of the village, contrive to embezzle a portion of it; they also plot and intrigue with some of the Patells and Desmooks to deceive the government Shaikdars and Mamlutdars, with respect to the amount of money actually realized, by returning some of the cultivators as dead, absconded, or as paupers, and exhibiting a false return of the quantity and quality of the land actually cultivated. There are instances of the Koolkurnies in the hilly country overawing the government agents, and completely thwarting them in their endeavours either to ascertain the real state of the districts or afford any redress to the complaints of the people. However they have considered it adviseable to conciliate such of the Mamlutdars as were of a fearless character and a meddling disposition. Such matters are commonly arranged with comparative facility among Brahmans, by which both the people and the government are frequently defrauded. It is seldom necessary to grant any remission (abatement) of the revenue to the Koly population, as the supply of rain in the hilly districts is pretty regular, but when this takes place, little or no benefit is ever derived by the wretched Koly from this act of generosity on the part of the government. The intermediate parties divide the amount among themselves, and the probability is, that the man it was intended for never hears any thing more of it. At all events, if he is sufficiently daring to question them upon the subject, some perplexing statement is read or explained to him, which compels him to remain silent. It is to be hoped that the spread of education will gradually ameliorate the condition of these ignorant, impoverished and much oppressed people; that it will diffuse among them a more elevated tone of moral feeling and moral courage, and enable them to assert their own rights by disclosing and checking the numerous irregular and fraudulent acts, of which the village and district officers, as well as the government agents, are so often guilty, when collecting the revenues of the state, and distributing justice to the vast population of its extensive territory.

The inhabitants of this part of the country (Rajoor, Malldesh, &c.) assert that their village lands were never measured, that the size of the patches of arable land was determined merely by estimation, and a certain number of these patches, or thikkas,[*] according to their dimensions, were considered to constitute a chour, or measure of one hundred and twenty begahs of land.

The revenue is therefore adjusted according to the ooktty or contract principle, but several modes exist under this head. First "the thickka bundy system," or patches of an estimated size and value—secondly "the outh bundy," or quantity cultivated with a plough either with two, four, or six bullocks,—thirdly, "the Dullie," or plots of ground cleared and prepared by means of the hoe or koitta.

A few poor Kolies (but much more frequently the Thakoors) cultivate small patches of ground with the hoe, or koitta, on the summits or declivities of the hills that are inaccessible to the plough; this the people term Dullie. The ordinary rent levied from a man for the extent of ground he can cultivate with the hoe is one rupee, and from a woman half a rupee annually. If the man and woman labour together, and the spot they cultivate is rather open, and the soil tolerably good, they will have to pay two, and sometimes three rupees. In the months of December and January they cut down the trees and bushes in particular spots, on the summits and the declivities of many of the hills, and when these have partly withered and the surrounding grass has become quite dry in the hot weather, they set fire to it, and after the first fall of rain, generally in June, when they have had a few fair days, they sow nagly, khoorachny, sawa, and wurraie broad cast. They endeavour to cover the seed with the ashes and a little earth, by scratching and drawing lines in a zigzag manner with the hoe.

The outh bundy system.—As the ground has not been measured, the Kolies sometimes pay their rents according to the quality of the soil and the quantity they can cultivate with a plough with four bullocks; for the best description of soil they pay 28 rupees annually; for medium soil from 18 to 22 rupees, and for the third or inferior sort sometimes only from 8 and 10 to 12 rupees. With a plough of four bullocks, a man will cultivate from 30 to 40 begahs of land. A plough with two bullocks will of course only have to pay half of the above rates, while one with six bullocks will have to pay half as much more.

In the low grounds, and along the banks of rivers or streams, there are patches of land composed entirely of black earth, and others of different mixtures, which vary much in quality; these are frequently classed under the term thikka, as well as the Mallzumeen (that is, the more elevated, less fertile, stony, red soil, clear of jungle) but the most productive and highly valuable lands are the thikkas, which have been divided into bhautt churries, or rice fields, and that have been chiefly formed by artificial means, on the shoulders of some of the more shelving and gently sloping hills, and in small ravines or gullies, by building a succession of bunds on imbankments across them, at suitable distances, and filling up and levelling the intermediate spaces. Erecting these imbankments, for sustaining the earth of each plot, must have been a work of immense labour and fatigue, for they are principally composed of very large stones. Contsant attention is required to be paid to them during the monsoon, to prevent the torrents that rush down the sides of the hills from destroying the fields and removing the materials of the imbankments. The dark reddish soil of these bhautt churries is very rich, and productive, being fertilized annually with a fresh supply of a mixture consisting of the debris of rock and decomposed vegetable matter, washed down by the monsoon rains.

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[*] Thikka, meaning a patch or lot, is a different word from the term Tukka, which means a few copper pice, and is applied to a measure of land in some parts of the country.

The finer and better varieties of rice, which are so much esteemed and prized by Brahmans and wealthy natives, are grown in the greatest perfection in these fields. The owners of these thikkas that are divided into bhautt churries, are allowed to cultivate a certain portion of the adjoining Mallzumeen, as they pay no rent for the usufruct of it, the cess on the bhautt churry originally including such an arrangement. The rent of each thikka varies from 2 to 10 rupees, all depending on the estimated size, &c. of the different plots.

Should a poor Koly, for want of means, forego cultivating his bhautt churry, he will very likely cultivate a portion of the Mallzumeen attached to it, for which he will pay two or three rupees. All the bhautt churry thikkas, as well as those of the Mallzumeen, &c. have names of long standing. The rent of each plot has never been altered within the memory of man. The only time when they try to effect a change, is when a man has laboured hard to clear a patch of the Mallzumeen, in which he sows the coarser descriptions of rice (takia, dhoull, &c.) which he can irrigate from its vicinity to a stream, should there be any scarcity of monsoon rain. The rent of such a plot is raised on this account, but the Koly will struggle to retain it at the rate he had previously paid, not considering it worth more to him. In the event of this being denied to him, he will threaten to quit the village,* and often moves off to a distance to escape from his creditors, and to avoid paying his arrears of revenue to the government agents.

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* Some years ago I took the liberty to recommend that the assessments on the lands in the hilly country should be lessened, were it only for a period of a few years, as the arrangement might tend much to induce the Kolies to remain in their own villages, and wean them from their wandering propensities, at the same time to guard against the Koonby farmers of the plain settling in the Koly villages. A system of much forbearance is required to be pursued in collecting the revenue, where such poverty exists, and where such injurious consequences are likely to result.

During the period that benefactor to his country, and most able and intelligent minister, Nana Phurnavees, was supreme in the management of affairs in the Mahratta government at Poona, he issued orders to the revenue officers, to hold out every inducement to the Kolies, and other inhabitants of the hilly country, to extend the cultivation, and to grow the finer sorts of rice, on a more extended scale, as the soil and climate of this tract appeared to bring these grains to such great perfection. And as the labour and expense of forming new bhautt churries, or rice fields, in the most desirable situations, would be attended with a considerable outlay of money, advances of cash were made to the people to enable them to form new fields, and repair the old ones, which were in such a very dilapidated state at the time, owing to the anarchy and confusion that had extended to this part of the country, when many of the Kolies had neglected their fields, and many families had been destroyed. The money advanced was to be repaid to government by instalments at a very easy rate.

The Kolies are much in want of such encouragements at present; for some of their fields are neglected, and others out of repair. The chief object ought to be to extend the number of their rice fields, which would ensure a more extensive cultivation of this grain. The interests of the government, as well as that of the people, would be much benefited by such an arrangement.

Notwithstanding there is a much greater fall of rain in this tract than in the open country, to the eastward, yet, owing to the rocky nature of the hills, and the little depth of soil in the valleys, the supply of water during the dry season is often very inadequate to the wants of the population. I have known several instances of the inhabitants of some villages, having to go to the distance of two and three miles for water in the hot weather, and what they procured was stagnant and filthy, from a pool in which buffaloes soaked themselves; so that it was with the greatest difficulty a person could drink it.

The following are the various sorts of grain cultivated by the Kolies. Rice, bhautt, tandool—first, that known by the name of Amby Mohur, is a small grain, but a superior description of rice; it is high flavored, rich and pleasant to the taste, consequently much esteemed by Brahmans, and wealthy natives. The Kolies in general sell it to the Bunniahs, at the rate of twenty seers (forty Bombay) the rupee. It is retailed in the Poona market from 12 to 15 seers per rupee, and from eight to ten seers the rupee at Ahmudnuggur. Cheemun sall—this is a much esteemed rice, being also a small and fine grain, but has no flavour—it sells at the same rate as the Amby Mohur. Jeery sall—this is also a fine grained rice, and highly prized; it sells at the same rate as the amby mohur. Krishen Sall—this is a coarser description of rice, and rather dark. It is called the black rice, and sells about twenty-two seers for the rupee. Kummode—this is a large grained rice, it possesses a high flavour, and is much sought after, as it is in general cheap, selling about twenty-four seers for the rupee. Raie Bhogg—this is a rather common rice, grain of a medium size, has little flavour, sells at the price of the Kummode rice. Sukwar rice—this grain is of a medium size, has no flavour, but is rich and glutinous, sells about twenty seers the rupee. Wurrunggull—this is a rather large grain, is coarse and tasteless, sells about twenty seers the rupee. Takkia—this is a large coarse grain. It is very insipid, sells from twenty-eight to thirty-two seers the rupee. Some of the poorer Kolies make it into bread. Dhoull rice—this resembles the takkia rice very much in being coarse and tasteless, and sells at the same price.

These three latter grains are sown on the mallzumeen, where it can be irrigated by some passing stream, otherwise they must depend on the monsoon rains. These coarse kinds of rice are sown early in June, after the first fall of rain, and ripen in September, and are consequently called hullwa, meaning early; while the finer kinds take longer time to attain maturity, and are called gurwah, or slow. They are also sown in June, and pulled up in July or beginning of August; the roots having been well washed, they are replanted in the bhautt churries, or fields prepared for their reception, and cut down in November. The operation of transplanting the rice into the new fields, is not only an important, but a tiresome and most fatiguing one. The new fields require being well soaked with water, and the earth softened, so that when the hand is placed on the surface it produces an undulation like a bog. The men and women employed provide themselves with small stools to sit on in the midst of this sheet of mud. It frequently rains all day, and they are teased in a distressing manner during the time by musquitoes, gnats, &c. A few weeks after this, when it becomes necessary to weed the rice, all engaged in the labour keep a cowdung bratty (cake) burning near each, that the smoke may assist in driving away these tormenting flies. Men and women use a description of covering of leaves and split bamboos, made to fit the body, and termed yearlah, to shelter themselves on this and all occasions from the rains. While weeding, it requires no small ingenuity to keep the piece of cowdung burning, owing to the rain and wind: they therefore are frequently obliged to keep it inconveniently close to them.

The Kolies dispose of the different kinds of finer rice to the Bunniahs or grain merchants, retaining only a very small quantity for their own consumption, on the occasion of particular festivals, and when visited by any friends to whom they are anxious to shew attention.

Nagly *(Cynosurus Coracanus)*—this small grain is sown broad cast, chiefly on the rough ground (dully), prepared for it with the hoe, on the tops and declivities of the hills, when the cloudy weather begins, and a few days before the setting in of the monsoon rains. Some of the Kolies sow at the same time a few seers of nagly, in a field that has been well manured with ashes and dung, and, in the month of Ashar (end of June or beginning of July), they transplant it into other fields in the mallzumeen, and, should the plant appear to be growing up too rapidly, for the purpose of obtaining a richer ear, the plough is used, and a plank is subsequently dragged over the corn, which presses it down, and checks its growth for some little time. It ripens in the end of October and beginning of November. Nagly bread is one of the principal articles of food of the poorer Kolies.

Khoorachny (*Verbesina Sativa*) is sown on the hills and mallzumeen in Jest and Ashwin. From this an oil is expressed, which is used for their lamps and in their food—the Pend or oil cake is very nourishing, and given to milch cows and hard working bullocks. Toor (*Cytisus Cajan*)—the toor (dholl) grown here is of the same kind as they have in the Konkan. It is sown in the same fields with nagly, in the mallzumeen, before the first fall of rain in June, and ripens in December and January; used as dholl. Rahlay (*Panicum Italicum*)—the Kolies sow a little of this small grain for their own consumption. Bhadully (*Paspalum Pilosum*)—this is sown after the first fall of rain. They eat this, prepared as bread, and boiled as rice. Sawa (*Panicum Miliaceum*)—this grain is sown broad cast, on spots of ground cleared for the purpose, on the tops and sides of some of the hills, also in the mallzumeen. It is sown early in June, and ripens in August. This is prepared somewhat similar to rice. Rajgeera (*Amaranthus polyganus*)—the seed of this plant is sown in June and ripens in December. This grain is eaten on fast days, being prepared as flour; it is mixed up with milk on such occasions. Waall (*Dolichos Lablab*)—the Kolies grow small quantities of this pulse which they use like split pease. Wheat (*Triticum Monococcum*)—Gowho—the Kolies sow the katiah wheat and pottah wheat, gowho, in the bhautt churries, in the end of November and in December, and it ripens in January and February. They keep the wheat for some merry making, or for festivals. Oordiah (*Phaseolus Max*)—they prepare, and use this as dholl, or split pease, for soup, in which a quantity of red pepper and salt are put. Hurburrah—known also by the name of chinna, (*Cicer arietinum*)—this grain is termed Bengal horse gram in some parts of India. The Kolies sow a small quantity of it in their bhautt churries in October and November, it ripens in January and February. Mussoor (*Ervum Lens*)—a small quantity of this pulse is sown after the termination of the monsoon. It is used as split pease. Wattanna Pisnur Salwun Pease—the Kolies grow a small quantity of pease in the cold season—the pea is very small and used as dholl.—Kodroo (*Panicum frumentaceum*)—this small seed is cultivated on the hills and in the mallsumeen; it is prepared and eaten after the same fashion as rice. Mukkah *(Zea Mays)* or Indian corn—a little of this grain is sown in June, and sometimes in December—it ripens in three months. The Kolies prize the ears much when toasted. Ambarry *(Hibiscus Canabinus)*—this is sown at the beginning of the monsoon. Some of the poor people eat the seed, mixed with other flour, the leaves are very bitter, but when mixed with red pepper and salt, it is much eaten with bread. The stalk is soaked in water and used as hemp for making ropes, &c. Tag, *(Crotalaria Juncea)*—this is sown in the beginning of the rains, and ripens in November and December. The stalk is used as hemp, for making ropes and a coarse material for bags, used by the Banjarahs for grain, salt, &c. and they feed their cattle on the seed. Sugar cane—Mahratta, *Oos*—they plant the canes entire, and close to each other (that is the end of the one joining the other), in the bhautt churries, which have been well manured and prepared for the occasion. This is in the month of October or November; the dew during the cold season keeps the soil moist, and the cane shoots up six or eight inches before the Hooly (at the vernal equinox). The cane is cut down in the following December—cane, grown after this mode, is said to produce sugar of a much better description, than that constantly watered from a well or stream. Jowarry and bajeere are not cultivated in these hills. The Kolies bordering on the plains, grow some bajeere.

They cultivate a few of the vegetables and legumes, commonly grown in the open country. Their jungles supply them also with a great variety of vegetables, from twenty to thirty sorts, besides fruits, berries, &c. The principal jungle roots are the anway, kaudur, chaie, sardull, pundah and turpull. The anway grows in the hardest red soil among the rocks, and consequently it is a difficult and laborious task to dig it up. In appearance, and in many respects in quality, it resembles the yam. The root is found from one to two feet buried in the ground; it sends forth a shoot like a creeper, which clings to any bush or tree near it. The substance of this plant is white, and it is boiled in milk. The natives of rank prize it much. The plant of which arrow root is made, grows abundantly in the hills and near some of the villages. The Kolies call it Sillinda, but they do not use it for any purpose.

The kaudur resembles the plantain tree. The root is much eaten by the Thakoors and some Kolies during a scarcity. They also eat the root of the turpull, pundah and chaie, when grain is dear. The sardull is a large bulbous root, and is also eaten by the Kolies in time of scarcity; it is extremely rough and unpleasant to the taste. They use it also to cure the guinea worm.

Their character and habits, &c.—From what has been stated it will be seen that the Mhadeo Kollies, must be considered a strictly agricultural people, and in general they appear to be well acquainted with the usual system of husbandry of the country. Many of them are hard working and diligent in their farming pursuits, and are consequently placed in pretty easy and comfortable circumstances, compared with a large portion of them who live in the greatest distress and poverty. Although the Kolies are quick and possess a good deal of shrewdness, they are not so steady and intelligent as the Koonby cultivators of the plain, being generally disposed to be more indolent, thoughtless and improvident. No doubt local circumstances, the influence of climate and the nature of an oppressive government, tended much to induce unsettled and predatory habits among them. A few of the most ignorant and destitute frequently quitted their homes, and fled to a distant part of the country, to evade paying their rents or adjusting their accounts with their creditors; while some of the most dissolute, who preferred leading a life of idleness, and enjoying such comforts as a little money only could procure, were in the habit of stealing privately to supply their wants, or joining a party of their kinsmen on a plundering excursion, most commonly into the Konkan, for they always have been a most determined and desperate set of robbers.* However, within these few years, they have been greatly restrained, indeed nearly weaned from this wicked propensity of helping themselves to the property of others. Generally speaking they are not so stout and robust in their persons as the inhabitants of the open country; their clothes, too, are of a coarser description and more scanty; but, in other respects, they differ little. In former days many were of a bold and high bearing; a spirit of great independence and freedom existed among them, chiefly inspired by their inhabiting a naturally strong and romantic country, where they could roam at pleasure, and enjoy the liberty their wilds conferred, by seeking refuge in their fastnesses, when they deemed it necessary to fly from the strong arm of power.

They may be considered a sober and temperate people, not being much addicted to the use of spirituous liquors; this, however, may be owing principally to their poverty. They are excessively fond of tobacco; they both chew and smoke it, and declare they could not exist without it—the elderly females enjoy this weed amazingly. Both men and women consume an immense quantity of red pepper in their food, conceiving that something heating is necessary, in the moist and cold climate of their hills during the monsoon.

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* They were in the habit of torturing persons they seized, in order to extort money from them. I recollect seeing the Patell of a village near Trimbuk in 1819, who was cruelly burnt by the members of a gang with the matches of their guns, as he refused giving them three hundred rupees. A man, the same gang had previously seized and treated in a most shamefully cruel manner, died in consequence.

The Kolies are rather apt to accuse each other of being faithless and cunning; they seldom communicate their intentions of a private nature to any friend. They also bear the character of being very revengeful, and gladly, but patiently, await an opportunity of secretly indulging their vindictive passions. But one of the most odious features in their character, is the envious spirit said to be more or less common to them. Any unusual superiority, good fortune, or happiness, visible among any of their kindred, kindles a feeling of such malicious envy in their bosoms, that they are frequently urged on to attempt, by some secret means, to lessen the happiness of the object of their hatred, by mixing some deliterious matter in his food, which may either kill him or render him an object of pity, during the rest of his life (this is supposed to be effected by magical powers); or they will injure his cattle, or set fire to his house, when it is well stored with grain.

Notwithstanding the Kolies exhibit so many vices in their disposition, to which the common ones of falsehood and deceit are to be added, yet, in their intercourse with each other, as members of the same village community, they in general bear a pretty fair character for honesty and plain dealing, and their readiness to aid and accommodate each other at particular seasons seems mutual.

Being thoughtless and imprudent, they are too easily misled by advice, that they ought without hesitation to disregard. The Kolies are readily elated with success, and, on the other hand, failure or misfortune greatly distresses them. They do not show great energy in contending with, or trying to overcome, calamity. In conversation they are very fond of using proverbs and similes. Very few indeed have received any education, or are able to write or read. Some are gifted with retentive memories, and although they are so illiterate, they appear to relate traditions connected with their own history with great precision. The animal perceptions of the Koly seem very acute, and their agility and speed are often very great.

Excepting the cow and the village hog, the Kolies eat all animal food; they are very fond of the wild hog, and occasionally contrive to kill it by pursuing and forcing it to leap down a precipice. It is a most exciting spectacle to see the inhabitants of two or three Koly villages, bounding with rapidity over the hills after the wild hog, shouting and cheering their dogs forward in pursuit of the game. The Kolies in the pay of government are armed with matchlocks and swords. They never appear to use the bow and arrow, although the Bheels in their vicinity scarcely use any other arms.

The Koly females are generally slender and well formed, with features of a pleasing expression. Some are very pretty. When compared with the stout, robust, and often coarse, Koonby women of the plain, a very considerable difference is perceptible. Where so much poverty reigns, we cannot expect the females to be particularly well dressed. The Koleens in general have a very limited wardrobe—the whole consisting of little more than two or three sarhies (and these are often much worn) and about an equal number of cholies. They tuck up the sarhy, after the fashion of the women of the Konkan, so that it seldom comes down lower than the knee. They have few ornaments; a small golden nose-ring, and, probably, a small ring of the same metal in each ear, with two or three silver rings on their fingers. The wives of some Patells and of the Naiks, of course dress a little better than the other women of the village. Yet all the Koleens are, like most other Indian females, fond of ornaments and dress. As wives (notwithstanding the Kolies have sometimes more than one) there is every reason to suppose, that they are as faithful, and as much attached to their husbands, as those of any other tribe. That there are instances of infidelity among them cannot be denied; but in their small villages there are seldom, or never, such instances of highly degrading and immoral conduct to be seen as are so prevalent in the towns and villages in the desh, or plain. Indeed the Kolies, both men and women, appear shocked at the dissolute manners of the population of the open country. The Koly women have commonly very large families; but many of their children die in their infancy of the small pox, the measles and hooping cough. They are affectionate mothers, and, notwithstanding the very laborious life they lead, seem cheerful and happy. Their time is much occupied with their domestic affairs and out door work. In fact their drudgery seems unceasing.

They rise every morning at dawn, and often before that time, to grind the corn required for the days consumption; they then milk their cows and buffaloes, and assist in driving them out to graze; they sweep the house and frequently plaster the floor; their business is to bring water from the river, which is frequently at a considerable distance. Cooking provisions for the family follows—besides attending to the children, or nursing one of them. However, it is during the rainy season, that the heaviest share of labour devolves on the Koly females.* They have also to perform a most onerous portion of the field labour, as they assist their husbands in the harassing task of transplanting the rice plants, and, at a subsequent period, of weeding them and the various grain growing in the other fields. They likewise contribute their aid at the reaping season.

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* In the months of August and September, the grass on the hills becomes very rank; that known by the name of Ghohona is said to possess a peculiar heating quality, and that the milk of cows and buffaloes that graze on it produces a great degree of stupor, and, on strangers, that it acts as a drastic cathartic.

It is the duty of one of the elderly females of the family to look after the dairy; as the milk in a few hours becomes sour in this country, the people for their convenience boil it. The Kolies for this purpose place their fresh milk invariably on a very slow fire, and it is gradually heated for several hours, when it is suffered to boil for a few seconds; after which, it is poured into flat earthen dishes, and some sour milk, or a little butter milk of the preceding day, is added, in order to thicken it; the following morning it is made into butter.* Once a week, all the butter that has been made is boiled sharply on a brisk fire, and strained while hot; when cooled it is termed ghee. They only make ghee during the monsoon and two of the cold months. Bunniahs travel about the country and buy it up weekly at a very low price.

As one of the days of the week is consecrated to each of the chief Hindoo deities, by their respective votaries, and kept as a fast, the Kolies dedicate one of their buffaloes or cows to these household gods, and all, who wish to be considered punctual observers of their religious rites, abstain from using the milk of the consecrated cow on these fast days. It is converted into ghee, and burnt in the evening, in a lamp placed before the family idols.

They sometimes burn some of this consecrated ghee near a precipice in the vicinity of water, to propitiate the tutelary spirits of the place to prevent any accident befalling their cattle, when descending into the bed of a river to quench their thirst.

To ensure the milk being readily converted into good butter, the Kolies insert a small piece of the bhoot khet tree into the slit end of the churning staff. This is supposed to possess the virtue of counteracting the influence of the evil eye (principally that of the females), and the machinations of the sorceress; therefore it is used for that purpose. When they fancy one of their cows has been enchanted, her milk driven away, or she objects to her calf sucking her, all supposed to be owing to the evil eye (especially of a female), they drive a peg, made of the bhoot khet tree, into the ground, to which they fasten the cow. This is said to act as a charm, the animal becoming quite submissive, and the milk immediately returning to her.

The Kolies are fond of charms or amulets. They believe, like many others of the inhabitants, that the tail of the chamelion possesses many virtues—that it will cure a fever of the tertian type, &c. &c. It is only on a Friday that they catch a chamelion they wish to destroy for the sake of its tail—they keep it all night in a pot with a little grain, and kill it on Saturday morning, when they divide the tail into little bits, and secure it in a small copper case. They, like the rest of the Hindoos, draw omens from the flight or passage of birds and animals. The circumstance of a crow, a cat* or a deer crossing a Koly, just as he has quitted his house, is considered unlucky; if they cross from the left to the right when he is proceeding on some important business, he will return and delay his departure for a few hours, or, probably, a day or two. However they sometimes rest satisfied with turning round on the spot they were standing upon at the time, and changing their shoes from one foot to the other, and then recommence their journey. A hare or snake crossing their path, either from the right or left, on similar occasions, they consider very unfortunate, and they will return home with the determination of deferring their journey; for they believe, that, if they should prosecute their journey after such an occurrence, they would not succeed in their object. When proceeding on business, they also have a great dislike to seeing the tass or Indian jay, particularly if it passes from their right to the left. If they happen to see this bird in front of them they will make an obeisance to it, and then pass on leaving it on their left hand. Meeting or seeing a jackal, is reckoned a very fortunate circumstance, when proceeding on business.

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* The butter and ghee, made from the milk of the cattle which graze on the coarse grass of the hills, is considered of an inferior quality to that produced from the milk of cows in the open country.

The Kolies seem to possess a little knowledge respecting the medicinal properties of the plants, &c. of their jungles and the mode of using them. They attribute much of their sickness (fever and ague chiefly) to their partaking largely of melons, gourds, mukka and vegetables, grown during the monsoon.

In fever cases they use the bhooie khollah, which is the name of the root of a creeper, known by the term peettanah. It grows chiefly in ravines that are well watered and shaded. The root is of a large white and bulbous nature, and they cut it into thin slices, and steep it all night in water; a little of this water is given to the patient to drink, and his arms and body are gently moistened with the liquid. They say it is only necessary to apply it a few times to cure a person attacked with fever. The leaves (large and round) of the peettanah are capital food for horses, rendering them sleek and fat in a very short time. The root of the kassada plant is also used in fever. It is an annual, and grows near hedges and dunghills; its leaves are small and resemble those of the tamarind tree; the flower is yellow and the seed is in a small pod, (there are two kinds of the plant). The root, after having been cleared of its bark or skin, is pounded, then mixed in a small quantity of water, and strained; a little is given in the morning, at noon and in the evening to the patient. A profuse perspiration is brought on, which tends much to produce an early cure. In very severe fever cases, it is given for several successive days if necessary.

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* As the Koly habitations are much infested with rats and mice, they keep cats to destroy them; but the large owl of their forests is, again, a great enemy of poor puss—when opportunity offers striking her talons in her neck and carrying her off.

In dysentery and diarrhœa they administer various medicaments. The fresh root of the bhooie sakly is pounded, and the juice expressed and mixed with goat's milk or with water. This is given for three successive days early in the morning, fasting. A little lime juice and sugar candy, to which is added some poppy seed that has been soaked all night in water, is mixed to form a paste, which the patient takes for three successive mornings. The root of the yell toorrah is prepared and administered in the same manner. The root of the ran (jungle) bhendy (*Hibiscus esculentus*) is pounded and mixed with dhyn, or sour thick milk, and administered also.

They cure wounds of all descriptions by filling them or placing over them the pounded bark of the dhoully khurmutty tree—they also use the pounded leaves of the cully-tree for the same purpose.

To children they give a small quantity (a pice weight) of the juice of the oombre tree, they obtain this before sun-rise, by making an incision in the bark of the tree; this is mixed with an equal quantity of the mother's milk, and given for several days.

In cases of marasmus in children, the pod of a creeper, called the morrar sengh, is ground down in milk or water; and the fruit of the komballna (a bush) about the size of a small lemon, are mixed together, and a small quantity given to the young patient for three or four days.

They use various roots as purgatives. For the toothache they apply a small pill, the size of a pea, made of the leaves of the ran (jungle) moggury. This is laid on the diseased tooth; if it touches the tongue or gums it raises a blister.

They are much annoyed with rheumatic pains in December and January. To cure this they apply the actual cautery and burning turmeric.

Beggars are seldom seen in the small villages in the hills; it might therefore be supposed that the inhabitants were not often called upon to exercise the duties of charity; however, it is known that there are many indigent, blind, and sickly persons who are supported entirely by the bounty of their relatives, who are actuated solely by the praiseworthy motive of strong natural affection. Very possibly a spirit of ancestral pride might induce a few persons to bestow a little in charity to their poor connections, rather than hear of their subsisting by mendicity among strangers. To persons passing through their villages, they are generally attentive and kind, and they will permit them to occupy the small temple of the tutelary deity of the place, or some family will grant them leave to sleep in the shed adjoining their dwelling, in which their household gods are kept. The Kolies build their houses by erecting a number of posts, filling up the intermediate spaces with wattle-work, plastered over with mud. The roof is thatched with grass. These dwellings, in general, are spacious, and commonly divided into several apartments. That in which the family usually assemble is the largest; the grain, stores, &c. are kept in another, which sometimes forms one of the sleeping apartments, and where the females retire to. Some of the cattle, especially the cows, are frequently kept in the dwelling house. The furniture in a Koly's house consists of two or three coarsely manufactured couches, used as beds; a few copper and brass pots for cooking and boiling water; small and large earthen pots for containing water, ghee, oil, spices, and a little grain. They keep their store of grain in large wicker baskets plastered with cowdung.

The Kolies pay their adorations to all the Hindoo deities, but their chief object of worship is Khundy-row, commonly called Khundobah. This is an avatar of Mhadeo, assumed by him when he destroyed the giant Munny Mull, and one of the most popular of the Dukhan objects of worship. His chief temple, in this part of the country, is at Jejoory. There is another of great repute at Bheema Shunkur, the source of the Bheema river—as this is in the tract inhabited by the Kolies, numbers of them attend there during the different festivals, especially on the Sheorattry, or night dedicated to Sheo, in the month of February. Bhyroo and Bhoany are also much worshipped by the Kolies. These three, and the derivative deity Heerobbah, constitute the Koly's household gods. They present offerings at the tombs of any Mahomedan saints, like the rest of the superstitious Hindoos, and at times they pay divine honours to persons whose existence may have been terminated in a violent manner, particularly if they, or their ancestors, were accessory to the event; in the hope of propitiating their favour, and that the past may be forgotten.

Their principal holidays are the Hooly, Dussera, &c. The Hooly festival is supposed to be in commemoration of the vernal equinox. The Kolies enjoy themselves greatly during this merry-making time. In many respects it may be compared to the Roman Saturnalia.

The Kolies commonly swear by Mhadeo and the bell bhundar, but the oath which they consider most binding, is that taken on the bank of a river, or near a well, when one of the party takes up a little water in the palms of his hands, and some bhundar, a few leaves of the toolsy, and of the bell, with a few grains of jowary are mixed; each of them pours this into the other's hand, at the same time imprecating evil upon themselves, if they act contrary to their declaration.

The Kolies generally celebrate the nuptial ceremonies of their children, when they are between the ages of six and ten years. The ceremonies attended to by them, correspond exactly with those performed by the Koonby cultivators (who are Shoodurs) on similar occasions. The expense incurred at a marriage by the poorer Kolies, varies from 15 and 20, to 25 and 30 rupees, and those in better circumstances expend from 40 to 60, while a few of the Patells and Naiks will disburse a hundred rupees and upwards. Many of them too often involve themselves inextricably in debt when their children are married.

It is a common practice among the Kolies for their widows to enter into the matrimonial state a second time, conforming to the pot or mhotur ceremony.

When a woman abandons her husband, and takes refuge with a man of a different caste, the husband performs the kreea kurm, or breaks the murkhy (pot); that is, he performs all the funeral rites, as if she had died a natural death, after which he is at liberty to marry again. But if the woman leaves her husband to live with another Koly, the kreea kurm is not then performed. A woman eloping seldom marries her paramour, according to the mhotur ceremony, until after her first husband's death. Should a Koly die, who had been very much attached to his wife, and she marry again, and she or her husband be attacked by severe sickness, or any unpleasant occurrence befall them, a Bhuggut is immediately consulted, to ascertain what is best to be done to restore health and peace to the family. The Bhuggut will most probably declare that the woman's first husband has caused the affliction, but, if suitable peace offerings are made by way of atonement, the distress and vexation complained of will be removed. She will consequently entertain some of her friends, and bestow some trifle in charity, besides having a small silver image (of the value of a rupee) made up, which ought to be a likeness of her first husband; this is cased in copper, and it is necessary she should wear it suspended from her neck, or place it with the household gods.

When a man dies who was never married, which among the Kolies seldom happens, they say an Attwor (unmarried) has died, and, unless offerings are made to his manes, previous to a marriage being celebrated in the family, it is said some great calamity will befall the bridegroom or bride; that they will be greatly tormented with sickness, have no offspring, or, in the event of their having children, that they will not be long-lived. Therefore to ensure happiness to the parties, a sheep or fowl is sacrificed as a peace offering, and a few friends are invited to partake of the feast. Should years have elapsed, and the family have removed to a village distant from that where the Attwor was buried, the party will go out into an adjoining field, to perform the ceremonial worship, before any stone (a substitute for the grave of the deceased), upon which some bhundar and koonkoo, &c. have been rubbed, and some jowary and a soopary nut placed. These articles and a burning lamp had previously been put into a flat brass dish, and carried to the spot by a female, over whose head four men held a stretched sheet by way of canopy; a boy holding a naked sword in his hand, and sitting upon a man's shoulders, follows the female, and he is made to shout and scream during the time the procession is moving.

The Kolies bury their dead, and observe the same funeral ceremonies as the members of the Shoodur tribe. The bodies of such persons as die of a lingering disease, also those who die suddenly, are burnt, their death being considered to have been caused by conjuration and witchcraft. They examine the ashes, either the same evening or the following morning, in the expectation of discovering some proof of the cause of the death; for they verily believe that if the deceased had stolen or unjustly retained any article of food or wearing apparel, &c. (and the owner of such an article consequently practised some necromantic pranks in order, that the thief or thieves might be visited by some affliction), that a small portion of the said article, enveloped in a part of the intestines, will remain unconsumed by the fire, and will be seen smoking when the rest of the body has been reduced to dust. If the friends of the deceased are satisfied that, by the magical powers of the owner of the article, their friend was put to death, they seized the supposed murderer, and reported the particulars of the affair to the government agents. If the man or woman, thus apprehended, could bribe the influential persons in the district, the affair terminated here; otherwise the magician was kept in confinement in one of the hill forts for some time.

Many of the Kolies experience a considerable degree of uneasiness and alarm, lest they should some time or other, incur the displeasure of some of the magicians* or witches in their neighbourhood, especially the Thakoors and their females, who have the credit of being very great adepts in the necromantic art. In such a state of society, we need not be surprised at hearing of such things, for history informs us, that the Egyptians, Jews, Greeks and Romans, also people of more modern times, believed in the reality of demoniacal possessions; that they supposed spiritual beings did occasionally enter into the sons and daughters of men, and distinguished themselves in that situation by capricious pranks and acts of wanton mischief; in fact, that they afflicted men and cattle with diseases. All nations and tribes immersed in ignorance and superstition, have much the same notions on this subject; the faith of few people is more staunch in the belief of such things than that of the Kolies.† Whatever malady man, woman or child, or even their cattle, may be seized with, the

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* There is a Koly family, consisting at present of several brothers, living in a village a couple of koss from Kotool, who are considered great bhootallies, or conjurers. They have the credit of having committed the most atrocious acts; any of their neighbours, who molest or annoy them, they distress at a most unmerciful rate. They destroy and lay waste the corn, the sugar cane and produce of the fields, of persons they dislike. Those that have attempted to make a stand against their evil practices have been forced to quit their homes, although they have expended money (in vain) to bribe persons of influence, in the hope of overthrowing the bhootallies. It is said that the members of the family, for a series of generations, have possessed this influential power.

† All the Hindoos and Mahomedans appear to dread the influence of incantations, and implicitly believe in the mischievous effects of the evil eye, the existence of ghosts and the power of witchcrafts.

Kolies imagine it is produced by the agency of some evil spirit or offended deity, and, after some time, having in vain attempted to cure the disease by the application of such medicinal remedies as they may be acquainted with, they consult some Deolushy, or an exorcist (or caster out of evil spirits), regarding the matter. The chief person, or any male or female, of the family, goes to the residence of a Deolushy,* (there is not one in every village), to beg, he will give his advice and assistance in removing the infliction with which they have been visited. The Deolushy is the Bhuggut, or attendant of the gods Khundobab, Bhyroo, Bhoany and Heerobbah. He makes minute inquiries, or affects rather to do so, respecting the nature of the sickness, and when all the necessary information has been communicated, he tells the person applying for his aid to go home, and to return to him the following day; that he will in the mean time consult his god, and that when he comes back, he will inform him what steps it will be necessary to take, in order to procure the wished for cure. When the person arrives on the following day, the Deolushy tells him that his family have neglected, for a length of time, paying their adorations to his deity, Heerobbah, and vows that were made, have never been fulfilled, or probably the Deolushy will remark that Bhoany, or Khundobah, is offended with the family, and that they must pacify the offended deity by suitable peace offerings. Should the Deolushy have informed the person that Heerobbah was offended, and that some one of the family, or their cattle, was now suffering in consequence, and that they had better make the necessary sacrifices and offerings to appease the deity—he would be asked to say, in what number of days the disease could be removed. The Deolushy possibly says in 15 days, and at the same time, prescribes for the sick person, recommending that he should follow a particular regimen, &c. He then goes to the censer in front of the shrine of his deity, and takes up some of the consecrated frankincence ashes, and gives a portion of it to the man to be rubbed on the forehead of the invalid, and he blows the rest into the air from between his fingers. Vows are now made that the necessary sacrifices shall be made, if the sick person recovers, within the time mentioned by the Deolushy. In this case it is announced that the ceremony will be performed during a particular month (after the termination of the rains); should the Deolushy's prophecy not prove correct, no further notice will probably be taken of it. The Deolushy mentions at the time, that, in addition to the offerings made to Heerobbah, sacrifices must be made to the other household gods. When the time for doing so approaches, three or four sheep are purchased for the occasion, if the family of the invalid can afford to expend so much money. Then, on a Monday evening, at the going down of the sun, two or three sheep are sacrificed as a peace offering to the goddess Bhoany (Dewee), and the gods Khundobah and Bhyroo, and the Gondhul ceremony takes place afterwards. In fact, a number of the neighbours come and partake of this great and noisy feast, and on Tuesday morning, when the sun has risen, the Deolushy gives the signal for the sheep, set aside for the offering to Heerobbah, to be sacrificed. A number of the villagers assemble now, not only to partake of the feast, but to observe the Deolushy performing the ceremonies customary on such occasions. All the women and children are either directed to quit the house during the time, or they are sent to such part of the dwelling as may be to the westward and out of the way, so that their shadow* cannot fall on the place to be occupied by the Deolushy. Near the spot where the household gods are placed, a fire is kindled, and a pot placed on it, into which four seers of oil are poured. When the Deolushy enters the house, he sits down near the household gods; some of the family prepare some dainty cakes, and choice bits of the mutton, which are deposited on the ground near the fire; while others cook the rest of the meat, &c. on a more extended scale. A band of musicians seat themselves close to the Deolushy, who now commences his operations. He is anxious to exhibit himself as if inspired, and to satisfy them that he has succeeded in getting the deity Heerobbah to enter into his person, he writhes his body about, casting his arms backwards and forwards, screaming and groaning, and shaking himself violently; in fact it might be supposed he was seized with strong convulsions; his hair is loosened, and hangs over his face and shoulders, so that he has much the wild, yet drowsy, appearance of a person overcome and exhausted from the effects of some powerful narcotic. The drummers carry on a dinning noice all this time, and, as the deity is now considered to have taken complete possession of his body, and the oil is boiling hot also, the audience preserve a dead silence, and the master of the house informs the Deolushy that the pot is ready; upon which he gets up and calls out to the people to stand clear, as he is anxious that the proceedings should not be interrupted in any manner more, especially be polluted by any impure shadow. He then takes a handful of bhundar (consecrated turmeric powder) in his right hand, and in the left he holds a bunch of peacock's feathers (in the end of which the image of Heerobbah is inserted), and resting on his shoulder. After having once or twice passed round the fire place, he sits down, then runs his hand along the edge of the pot two or three times; after which he raises it a little and gradually lets the bhundar fall into the oil. He places the flat of his hand now on the boiling oil, and when he withdraws it, he jerks the oil off his hand into the fire, by which the flame is greatly increased. A portion of the cakes and meat, which had previously been deposited near the fire place, is now taken up by the Deolushy, and cast into the pot, and, when he conceives it is sufficiently cooked, he searches about with his hand in the boiling oil, till he has found all he put in, after which the remaining cakes and meat are cooked in the same way. The guests having seated themselves on the floor, the members of the family, who had been very busy cooking breakfast for all the people present, are now ready to serve it out, and only wait to do so until the Deolushy presents each person with a small quantity of that which he cooked, and which is considered consecrated. When the feast is finished, the master of the house requests the Deolushy to say, if every thing has been properly conducted ; the Deolushy remarks that, as the sickness has disappeared, and the peace offering has been suitably tendered and accepted, they ought to show their gratitude to the deity, and be most particular in making him a similar offering every third year—at all events once in every four or five years. He particularly impresses on them the necessity of their acting conformably to this advice; he then presents them with some ashes from his censer, and tells them to rub a little of them on the forehead of the person that had been unwell, and to put a little into his mouth; he now receives a small fee, or is presented with a turban worth a rupee or a rupee and a half, and takes his departure.

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* Various castes follow this profession, goldsmiths, carpenters, smiths, Kolies, Thakoors and even Dheres; but, among all of them, the Thakoors are most noted.

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* One of the superstitious ideas of the natives, is, that even the shadow of a female, unless when a child or an elderly woman, pollutes their gods.

If the Deolushy found the oil insufferably hot, when he introduced his hand, he called out in a stentorian voice that their proceedings had been polluted, and that they must recommence the operation. He would likewise show symptoms of disappointment and of great displeasure. If a spectator expresses his surprize at the Deolushy's hand not being burnt by the oil, the Deolushy takes his hand, telling him not to be alarmed, but to allow him to prove that the danger is not great. The man, to his astonishment, finds the boiling oil perfectly innocuous, and not warmer than fresh milk from the cow.

The Deolushy, being considered possessed with the god Heerobbah during this ceremony, and therefore gifted with oracular powers, if any present should have left relatives ill at home, or cattle sickly or dying, or should they have incurred any very serious loss or injury, they ask the Deolushy, to inform them of the cause for such misfortune. He tells them that Heerobbah is offended with them, or that they made a vow to Bhoany which they have neglected to fulfil; or he may say that his god is not displeased with them, so they had better consult some other deity.

The Deolushies are considered to possess specially the power of detecting the evil practices of witches and conjurers ; but, as they are not all equally talented and cunning in their art, their answers are not always received with implicit faith ; therefore if the conduct of a person is to be searched into, several Deolushies are in the course of time questioned, and if their answers corroborate each other, it is concluded that the conduct of the suspected person is such as to justify their shunning his society. They are also consulted about absent friends, and thieves, and the recovery of stolen property. The thief sometimes throws himself on the mercy of the Deolushy, offers to bribe him to silence, and to restore the property, for which the owner also tenders a present. When a Koly has lost one of his cows, he sometimes goes to ask a Deolushy where he is to find the animal. The Deolushy, after consulting his deity, tells him to go in some particular direction, and that he will find the animal.

The following may be considered a singular case of apotheosis, and I relate it here as a Deolushy was consulted on the occasion.

A short time before the Mahomedans relinquished possession of the hill forts in the western Ghauts, there were two Kolies of the name of Dharrow Assallah and his son-in-law Dharrow Sablah, who had rendered themselves very notorious and troublesome by the daring robberies they committed in the Mahomedan camps. Orders were at length issued for apprehending them, or putting them to death, but, both of them being extremely active and cunning, it seemed a most difficult undertaking. Chappajee Bhauggrah, the Koly Naik of Sukurwary, was then employed at Joonere, and he was urged to exert himself to capture Assallah, and that he would be rewarded for his trouble if he succeeded. After many hair-breadth escapes, Assallah was surrounded, in the vicinity of Koomsett, near Hurrychundurgur, and stoned to death, as he was considered invulnerable to arms of all descriptions.

It is said Bhauggrah was much troubled after Assallah was put to death; a Deolushy or Bhuggut was therefore consulted to ascertain the cause of his distress. This man stated that the Naik was the principal instrument employed to put Assallah to death, and that the ghost of the deceased had on this account haunted him, and would continue to do so till measures were taken to pacify it, which would ensure peace and quietness to himself and his family. The Deolushy recommended to Bhauggrah to have two silver* images made, worth three or four rupees; the one to be a likeness of Assallah and the other of Sablah. After these were consecrated he was to worship them, and place them with his household gods. Two stone images were also to be made and painted with red pigment; these were to be erected on the different spots where the two Kolies were killed. Bhauggrah acted in conformity with the Deolushy's recommendation, and the eldest son of the chief representative of the family, worships these images and presents offerings to them on all festivals; and on the 2d of Magh offerings are sent to be presented to the stone image at Koomsett. At the celebration of a marriage in the family, the bride and bridegroom go to Koomsett, and prostrate themselves before the image of Assallah, and supplicate his blessing.

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* The image in possession of the family is a small one of gold.

(To be concluded in our next).

XI.—*Essay on the Metrical Compositions of the Persians.—By Lieut.* T. J. Newbold, Aid-de-Camp *to Brigadier General* Wilson, c. b. *Member of the Asiatic Societies of Bengal and Madras.*

With the view of affording the general reader as concise and plain an outline of the art of versification among the Persians, as it will admit of, preparatory to a future more extended analysis, I will preface this paper with a few remarks on the structure of their metrical compositions, digested from several of the most approved Persian treatises on the subject, and divested as much as possible of those technicalities and over refined subtleties, with which their authors love to obscure and mystify the theme under discussion.

Poetry they define as a discourse that has been weighed, *Kalám-i-Mouzún.* The balance by which the due proportion of its component parts is ascertained is prosody. It must be composed in one of the fixed *Bahúr* or measures, and must rhyme.

The *Arkán* ارکان or poetical feet.

The *Arkán* form the poizes against which the words forming a metrical line are weighed. They are eight in number, and are composed of long and short syllables according to their vowels. By variety of arrangement and repetition they form,

The *Bahúr* بحور

The *Bahúr* are the fixed measures in which all Persian and Arabic poems are written. The original measures are nineteen in number. From these have sprung various others, minutely specified by the Persian grammarians : with an enumeration of these varieties I will not here fatigue the reader.

The subjoined note (*a*) will shew the names and order of the 19

(*a.*) The 19 original measures—*Bahúr-i-Núazdah.*

1 Tawíl	طویل	11 Makzab	مقضب
2 Madid	مدید	12 Mohtabis	محتبث
3 Basit.	بسیط	13 Sari	سریع
4 Wáfir	وافر	14 Jadíd	جدید
5 Kámil	کامل	15 Khafif	خفیف
6 Hazaj	هزج	16 Karíb	قریب
7 Rijz.	رجز	17 Mushákil	مشاکل
8 Ramal	رمل	18 Mukárib	مقارب
9 Munsurij	منسرح	19 Matadárik	متدارک
10 Muzaria	مضارع		

The 13th 14th and 15th of these measures are peculiar to the Persians and the five first to the Arabs.

original measures—the 8 *Arkán* or feet of which they are composed—the sounds or syllables forming the feet—and the mode of constructing a metrical sentence or verse on this treble base—together with the application of the *Arkán* in scansion.

The 8 poetical feet *Husht Arkán*—composing the measures.

1	Fa-u-lan	فعولن	5	Mu-fa-i-la-tun	مفاعلتن
2	Fa-i-lan	فاعلن	6	Mu-ta-fa-i-lun	متفاعلن
3	Mu-fa-i-lan	مفاعیلن	7	Fa-i-la-tun	فاعلاتن
4	Mus-taf-i-lun	مستفعلن	8	Maf-u-la-tu	مفعولات

The sounds—*Asúl* (lit. the roots) composing the feet.

Of these there are three denominations—viz. *Sabab, Watad,* and *Fásilah.* Of the first there are two kinds—viz. *Sabab-i-khafíf* and *Sabab-i-sakil—Sabab-i-khafíf* is a word of two consonants, the first of which is accented with a moveable vowel (*Mútaharrik*) and the last quiescent (*Sákin*) as کم *kam.* *Sabab-i-sakil* is when both are accented, as ازو Azo.

There are two classes of *Watad,* viz. *Watad-i-majmú* and *Watad-i-mafrúk—Watad-i-majmu* is a word of three consonants, the two first of which are accented with moveable vowels leaving the last quiescent, as علن *Alan.* *Watad-i-mafrúk* is also a word of three consonants, the first and last of which are accented and the medial quiescent, as راس *Ras-a.*

Of *Fásilah* there are also two classes, viz. *Fásilah-i-soghra* and *Fasilah-i-kubra. Fásilah-i-soghra* is a word of four consonants, the three first of which are accented with moveable vowels and the last quiescent as حبلن *Habalan.* *Fásilah-i-kubra* is a word of five consonants, the first four of which are accented and the fifth quiescent as سمکتن *Samakatan.*

The method by which the Persians form the light feet from these roots is based on the principle of equalizing quiescent by quiescent and vowelized (if I may so express myself) consonants.

For example—the foot *Mu-fa-i-lan* (No. 3) مفاعیلن as denoted by its vowel and quiescent marks, is composed of one *Watad-i-majmu,* followed by two *Sabab-i-khafíf*—that is to say, it comprizes in all seven consonants, the two first of which are vowelized; the third quiescent or gezmated (*Watad-i-majmu*); the fourth vowelized, the fifth quiescent (*Sabab-i-khafíf*); the sixth vowelized; the seventh quiescent (*Sabab-i-khafíf*).

The feet thus composed form in their turn, as above stated, the various measures in which poems are written. These are all minutely laid down and examples of the different metres separately adduced in the Persian treatise on the *Arspoetica.* For example, the measure Hazaj (No. 6.) consists of the foot *Mu-fa-i-lan* (No. 3) repeated 4 times in the hemistich; and the measure *Mutaddrik* (No. 19) of the foot *Fa-i-lan* (No. 2) the same number of times. The 2 following hemistichs, written in the above measures, may suffice to exhibit the use of these standards in versifi-

The *Misra* مصرع or hemistich,
is a single line composed in one of the nineteen measures.

The *Beit* بیت or distich,

consists of two *Misras* rhyming together (*Múkaffa* مقفى). Two *Misras* not rhyming are called a *Fard** فرد. For instance:

بيت

خداوند بخشنده ودستگير
کریمي خطا بخش پوزش پزير

Beit.
Khudáwand, Bukshindah wa Dastagír
Karími, Khatabuksh pozish pazir.

---

cation, and the application of the feet in scansion or *takti* تقطيع (lit. cutting in pieces).

مصرع

دلا وصف میانے نازک جانان من گفتي

Hemistich—Measure *Hazaj*, or *Mufailan Mufailan Mufailan Mufailan*
Dila wasf-i-miyani nazuk-i-janan, i man gufti.

Persian mode of scansion of the above.
Dila Wasfi—*Mufailan*—Miyani na—*Mufailan*
Zuk-i-janan—*Mufailan*—ni Man gufti—*Mufailan.*

مصرع

حسن ولطف ترابنده شد مهرو مه

Hemistich—Measure *Mútaddrik*, or *Failan, Failan, Failan, Failan.*
Husn o lutfi-tora bandah shud mihr o mah.

Scansion.
Husn-o-lut—*Failan*—fi-tora—*Failan*
Bandah shud—*Failan*—Mihr-o-mah—*Failan.*

Rules for the quantity of the syllables are laid down with great minuteness in the Persian and Arabic treatises. Sir W. Jones's Persian Grammar contains a short though lucid article on the subject, to which the reader is referred.

* Poetical compositions, by the early Persian writers, were classed under three heads, viz. the *Kasideh*—the *Masnavi* and the *Musammat.* In after times they have been divided into eight—viz. the *Fard*, the *Rubái*, the *Kita*, the *Masnaví*, the *Ghazal*, the *Kasideh*, the *Musammat* and the *Tarji.*

فرد

به پوش گر بخطاي رسى وطعنه مزن
که هيچ نفس بشر خالى از خطا نه بود

Fard.

Ba posh gar ba khatái rasiwa tána mazan
Kih héch nafs bashar kháli az khata na búd.

The first word of the first line of a *beit* or distich is termed the *sadr* صدر, its concluding one the *arux* عروض. The first word of the second line is called the Matla مطلع and its last the Ajuz عاجز. The two last are by some styled the *Ibtida* ابتدا and the *Zarab* ضرب. The intervening words are called the Hasho حشو.

For instance, in the preceding *beit*, the word *Khudáwand* is the *Sadr—Dastagír*, the *Arux—Karim*, the *Matla*, and *Pazir*, the *Ajúz*. The words in the centre of the lines enclosed by these four, constitute the *Hasho*.

The *beit* has sometimes a double rhyme—in such cases the penultimate is termed *Kafiyeh* قافيه and the ultimate *Radif* رديف. In the subjoined distich *Hastí* and *Pastí* form the *Káfiyeh*, and the two *Toí* the *Radíf*.

بيت

پناهى بلندي وپستى توئي
همه نيستند آنچه هستي توئي

Beit.

Panah i bulandi wa pasti Toí
Hamah nestand án chih hasti Toí.

The *Rubài* رباعي

or quatrain, consists of four *misras*, the two first of which rhyme with the fourth—for instance :

رباعى

ايدل طلب كمال درمدرسه چند
تكميل اصول وحكمت هندسه چند
هر فكركه جز فكر خدا وسوسه است
شرمي زخدا بداركين وسوسه چند

Rubài.

Ai dil talab kemál dar Madrasah chand
Takmil-i-asùl wa hikmat-i-hindasah chand
Har fikr kih juz fitr-i-khuda waswasah ast
Sharmi az khuda badár kih in waswasah chand.

Sahibi is celebrated for the beauty of his *Rubaiyàt*. A *Rubài* resembles in rhyme the four first *misras* of the *Ghazal;* and is generally written in the same measure, viz. the *Bahr-i-Hazaj*, or in one of its varieties. According to the *Dustùr-i-nazm*, a measure for the *Rubài* has lately arisen composed from the measures of the *Muzària* and *Mushakil*, and called the *Bahr-i-Ruba-yat.*

The *Kita* قطعه

Never comprises less than two couplets—in the *Kita* the two last lines of each distich are most frequently made to rhyme, though there is no fixed measure for this class of composition. The first *Kita* in the *Diwan* of *Hafiz* is written, like a *Masnavi*, in rhyming couplets.

قطعه

اي كريميكه ازخزانهٔ غيب
گبر وترسا وظيفه خورداري
دوستانرا كجا كني محروم
توكه با دشمنان نظرداري

Kita.

Ai karími kih az khazanah-i-ghaib
Gabr wa tarsa wazífah-i-khud dári
Dostánra kúja kani mahrúm
To kih bá dúshmanán nazer dári.

The *Kitas* of *Sàdi* are in the highest esteem. This class of composition rarely exceeds twenty couplets.

The *Masnavi* مثنوي.

In the *Masnavi* both lines of the distichs rhyme together—for instance:

مثنوي

الهي غنچهٔ اميد بكشاي
گلي ازروضهٔ جاويد بنماي
بخندان ازلب آن غنچه باغم
وزين گل عطر پروركن دماغم

Masnavi.

Illahi ghunchah-i-umaid bakùshài
Gùli az rouzat-i-jàwìd banùmaí
Bakhandan az lab-i-àn ghunchah-i-bàgham
Waz-in gul attar parwarkan dimàgham.

Compositions written in this style never contain less than 12 couplets and are often of great length—romances, love-tales, histories and epic poems—the *Shah-nameh* of *Firdousi*, the *Makhzen al Asrar*, the *Shirin wa Khasro*, the *Secunder-nameh* of *Nizàmi* and numberless others are of this stamp, which may be truly called the heroic verse of Persia.

The term *Masnavi* is more strictly confined however to poems bearing this name—the productions of *Jámi*, and *Mouláná Rúm*—its rhymes are generally double. The measures in which it is most frequently written are seven in number—viz. 1st the *Bahr-i-Sari*—2d, the *Hazuj Ajzab-Makbúz Makhzúf Musaddas*—3d the *Mukárib Maksúr Musamman*—4th the *Ramal Musaddas Maksur*—5th the *Khafif Maktúa*—6th the *Hazaj Makzúf Musaddas*—and 7th, the *Ramal Majnún Muktua Musaddas.*

It is also termed مزوج *Muzawwaj*, paired, from its rhyming couplets.

The Malays have a species of verse resembling the *Masnavi*, known under the generic term of *Sayer*, in which their romances and moral poems are written.

The *Ghazal* غزل.

Is a short ode, generally on the delights of wine, love or beauty, comprising from 5 to 18 distichs ; or, according to some writers, from 3 to 25. Under the outward symbols of sensual delights and terrestrial pleasures, are frequently concealed metaphysical meanings and allusions to divine love and spiritual beatification.

In *Ghazals* the two first lines must rhyme with the second line of each succeeding couplet—for instance in the following extract of an ode from *Akhsangi :*

غزل

ای شمع زرد روی کہ با اشک دیده
سرخیل عاشقان مصیبت رسیده
فرها دوقت خویش وهی سوز وی گداز
تاخود چراز صحبت شیرین بریده
یاري به باد دا ده ارنه چرا چون
بدرنگ واشک بار و ازار وخمیده

Ghazal.

Ai shama zard rúi kihbà ashk dìdahi
Sar-khail-i-áshikán-i-masìbat rasìdahi
Farhád-i-wakt khèsh mèsòz wa mègudàz,
Ta khud chira az sohbat-i-Shìrìn baridàhi
Yàri ba bàd dàdahi ar nah chira chù man
Bad rang wa ashk bàr wa nizàr wa khamìdahi.

The first distich of a *Ghazal* or *Kasidah* is called the *Matla* مطلع or the *Mabda* مبدا. The second, the *zeb Matla* زيب مطلع or *Husn Matla,* حسن مطلع and the concluding distich the *Makta* مقطع or *Khatimah* خاتمه. The poetical title of the poet is often introduced in the *Makta*—as in the odes of *Hafiz.*[*]

Ghazals are set to music and are composed in the measure *Hazaj* (No. 6).

The *Sáki nameh* ساقی نا مه.

The *Sáki-namehs* of Hafiz, though rhyming like the *Masnavi,* rank next to the *Ghazal.* They comprize from eight to forty verses, in praise of wine and bacchanalian enjoyment, addressed to the cup-bearer *(Sáki).* Like the *Ghazal* they not unfrequently conceal a mystic meaning. The *Sáki nameh* may be styled the Persian dithyrambic.

The Kasidah قصيده

Is longer than the *Ghazal,* although rhyming generally in the same way. It comprises from 15 to an unlimited number of couplets, commonly ranging however between 70 and 170. The subject of the *Kasidah* is of graver and more serious import than that of the *Ghazal,* though it sometimes condescends to embrace forms aerial and creations of the imagination in its numbers, at the expense of its name. For instance should it dwell upon the budding pleasures of spring—its refreshing verdure—or, butterfly-like, revel a moment in the full blown charms of the blushing rose, it loses the name of *Kasidah,* and is called *Bahariyeh* (from Bahar بهار spring). Should it treat of love it becomes an *Ishkiyah,* and when of the poets own renown—a *Fakhriyah* (from *Ishk* عشق love and *Fukhr* فاخر glory).

It sometimes happens that the name is given with reference to the letter in which the *Kasidah* terminates. For instance, should the last *misra* conclude with the letter م *Mim,* it becomes a *Mimiah*—if with ج *Jim,* a *Jimiah* and so on.

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[*] This practice has obtained, according to the author of the *Zuwábit i asím,* from the time of *Sádi.*

Amrulkais, one of the seven early poets of Arabia, whose compositions were written on silk in letters of gold and suspended in the temple at Mecca, is the reputed inventor of the *Kasidah.*

Under the head of *Kasidah* may be classed the *Hajo* or satire—the *Madah* or encomium, and the *Wáz* or *Pandnámahs*—ethic poems.

The *Mustazad* مستزاد.

This is a stanza, each line of which has a shorter one appended. According to the author of the *Dastur-i-nazm* the *Mustazad* is written in the measure *Bahr-i-Rubayat*, and sometimes in that of the *Muzária.* The stanzas consist generally of four long and four short lines. The following example is from the *Zuwabit-i-Azim :*

مستزاد
ان باد شاه اعظم
یعنی خفیف ما
در بسته بود محکم
یعنی نه بود پیدا
ناگاه دلق آدم
یعنی لباس اسما
پوشید و بر در آمد
یعنی که شد هویدا

Mustazad.

An Badshah i ázam
Yani khafif i ma
Dar bastah búd Mahkam
Yani nah bud paida
Nagah dalk i Adam
Yani libas i Asma
Poshid wa bar dar amad
Yanikih shud huwaida.

The *Musammat* مسمط.

Mouláua Wahid uddin Tabrízi defines the *Musammat* as comprising from four to ten *misras* or hemistichs, all rhyming together except the last. Should the *Musammat* consist of four *misras* it is hence styled a *Murabba*—if of five, a *Mukhammas*—of six a *Musaddas*—of seven, a *Músabba*—of eight, a *Músamman*—and if of ten, *Múasher.*

Of these the *Mukhammas* is most in vogue. The following is a specimen of the *Murabba* from *Sádi* :

مربع

من مانده ام رنجور ازو
درمانده ام مهجور ازو
كوي كه بيني دور ازو
در استخوانم ميخلد

Murabba.

Man mándah am ranjúr az ó
Dar-mándah am manjúr az o
Gói kih bíní dúr az o
Dar ústakhánam me khalad.

The subject of this class of composition is most commonly the pains of love—separation from its object—expostulation and entreaty. The five *misras* of the first *Mukhammas* in the *Diwan* of *Hafiz* rhyme all alike in *am*, in which also terminate the concluding *misras* of the succeeding nine. The following is a specimen :

مخمس

كو بخت كه از سر نيازي   در حضرت چون تو دل نوازي
معروض كنم نهفته رازي   هيهات كه چون تو شاهبازي
تشريف دهد در آشيانم

Mukhammas (Hafiz).

K'o bukht kih az sar nujazi   Dar hazrati chún to dil nuwázi
Máruz kunam nahaft rázi   Haihat kih chún to shahbázi
Tashrif dihad dar ashianam.

The *Musaddas*, the *Musamman* and the *Muasher*, terminate with a couplet rhyming differently from the preceding ones.

The *Marsujah* مرثيه

Is an elegy or dirge, consisting generally of upwards of 50 stanzas, arranged like the *Musamman*.

The *Tarikh* تاريخ

Is a stanza frequently used for inscriptions on edifices and tombs—from the numerical value of the last letters of the last *misra*, the date of the building is known. It is also used in historical and biographical treatises. The *Diwan* of *Hafiz*, contains a number of *Tárikhs* ; as also the *Tazkirat-i-Serkhúsh.* The numerical value of letters is ascertained from the *Abjad.*

The *Tarji band* ترجیع بند

Must not comprise less than five, or more than twelve, couplets. It derives its name from the recurrence of a line or distich at fixed intervals (Tarji ترجیع signifying receiving back).

The *Terji*, or *refrain*, at the end of each of the 7 *bands* or sets of verses in the Diwan of Hafiz, is as follows :

آن به که از صبر رخ نتابم
باشدکه مراد دل بیابم

An bih kih az sabr rúkh-na tabam
Báshad kih murád i dil biyábam.

The *Terji-bands* of Hafiz rhyme like the *Ghazal*, with the exception of the concluding couplet or *terji* as above, which is a rhyming distich. They contain severally from 7 to 9 couplets.

The *Tarkib-bands* are more irregular in their rhymes, sometimes commencing like a *masnavi*, but generally like the *Ghazal*, and terminating in a rhyming couplet. Those in the *Diwan* of *Háfiz* turn chiefly on the praise of kings—kingly qualities, &c. The *Terjiband* has been selected as the vehicle for conveying lamentations on separation from friends.

The *Chistán* چیستان

Is an enigma in verse and prose.

The *Diwan* دیوان

Is a collection of *Ghazals*, corresponding in order and number with the letters of the alphabet, *Harúf-i-tahji*, in which their *radífs* rhyme in regular succession. The term diwan is not confined to an assemblage of odes, but is also applied to posthumous collections of an author's works either in prose or verse.

The *Khamsah* خمسه.

Khamsah in Arabic signifies five, and is a name given to collections of poems five in number—generally *Masnavis*. Among the most noted are the *Khamsahs* of *Nizámi*, *Jámi*, *Hatifi*, *Katibi* and *Amir Khusro*. That of *Nizami* (of which I possess a beautiful copy) comprises the *Makhnan al Asrar*, the *Khusro wa Shirin*, the *Haft Paikar*, the *Leila wa Majnun* and the *Secunder Nameh.*

The substance of these remarks has been almost entirely extracted from Persian treatises on prosody and versification, modified by the result of a careful examination of the compositions of some of their best poets. With the latter the numerous discordancies and perplexing opinions expressed in the former have been compared and considered, and the result alone, for the sake of brevity, communicated.

The treatises on prosody consulted were those contained in the *Zuwúbit-i-azim*, the *Chuhar Gulzar*, the *Mukhtaser al Fuaid* and the *Dastur i Nazm.*

A brief notice of some of the Persian Poets.—By Lieut. T. J. Newbold.

(*Continued from* No. 13, Vol. IV, P. 389).

Jami Moulana Nur-uddin.

جا مي مولا نانورالدين

A famous poet born at the town of *Jam*, near *Herat* in *Khorassan*, whence he derives his surname, about A. H. 817. His proper name is *Abdur Rahman Bin Ahmed*. The date of his demise is said to be A. H. 898. He repaired at an early age to the splendid court of *Sultan Abu Syed Merza*, a descendant of *Tamerlane*, who ruled in *Khorassan* until 873, A. H., when he was defeated and put to death by the Turcoman leader *Hassan Beg*. *Sultan Hussain*, who eventually succeeded *Abu Syed*, extended his protection to *Jámi*, and treated him with greater favour even than his former patron. The Sultan's vizier, *Mir Alli Shah*, entertained for *Jami* the greatest friendship and attachment. These circumstances, and the numerous lively anecdotes related of him by various Persian writers, stamp him to have been a man of ready wit, engaging disposition, and a keen observer of men.

A native of Ispahan, who was accustomed to boast of the productions of his own provinces, and to regard with contempt any thing foreign or extraneous, told *Jámi* one day that there were melons at Ispahan, of such an extraordinary size, that if a person sat on one he could not touch the ground with his feet, the poet retorted, "We have not in truth, at *Herat*, melons as large as those you have been at the trouble of describing, but we have turnips several cubits in length."

Another of *Samarcand* was one day extolling a species of grape peculiar to his country, called *Resh-i-Bâba*, the beard of one's father. *Jami* asked him whether that grape was more delicious than a sort growing in *Khorassan* called the *Khayeh-i-Ghulaman*. The man of *Samarcand* answered in the negative; when *Jami* observed, "in that case you must admit that the *Khayeh-i-Ghulâman* of *Khorassan* are of more value than the beards of your fathers, *Resh-i-Bâba*.*

One day a poetical aspirant read to *Jámi* a wretched poem of his own composition; of which, he boasted, not a single word contained the letter *Alif*. *Jami* dryly remarked that he had better have left out all the letters of the alphabet.

It is said that, on one occasion when *Jâmi* had set out for the purpose of paying a visit to his patron *Sultan Abu Syed*, on his way to the palace he heard that the monarch was immersed in the pleasures of the banquet: on this he retraced his steps. When the *Sultan* was apprised of the circumstance, he despatched some of his attendants to recall him. On this, *Jámi* composed a *Ghazel*, *extempore*, and sent it to the Sultan, in which *Jámi* excuses his *mal-a-propos* intrusion. The two following couplets are extracted from the ode in question:

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* This pleasantry ill bears translation: the pith of *Jami's* jest will be sufficiently obvious to the Persian scholar.

رباعي

نه زهد آمد مرا مانع نه بزم عشرت ایشان
غم خود دور میدارم ز بزم عشرت اندیشان
بجایی کاطلس شاهان نشاید فرش کرد حاشا
که راه قرب یابد دلق گرد آلود درویشان

Rubai.

Neither abstinence, nor the banquet of the votaries of pleasure, are obstacles to me.

I keep my sorrows apart from the feasts of the gay.

It would be improper to spread my humble carpet on the place where shine the satins of princes.

The dust-soiled garment of the dervise finds a nearer way to God.

The compositions of *Jámi* are extremely numerous. The *Anthologia Persica*, printed at Vienna, in 1778, contains a list of upwards of forty. *Mahomed Bukhtawer Khan*, one of his biographers, declares them to be innumerable.

Jami's principal works are:—

سلسلة الذهب

The *Silsileh uzzahib*—a poem in three books.

قصه سلامان والسال

The *Suliman-wa-Assal.*

رقعات جامی

The *Kukaat-i-Jámi*—a collection of epistles.

سبحة الابرار

The *Subhet-al-Abrar.*

سکندر نامه

The *Secunder námeh*—an epic on the exploits of Alexander the Great.

دیوان جامی

The *Diwan-i-Jámi*—an elaborate collection of poems, containing many of the mysticisms of Mahomedan theology.

بهارستان

The *Baharistan*—a descriptive poem dedicated to *Sultan Hussain Baicarra.*

ليلي و مجنون

The *Laila wa mejnun.*

يوسف وزليخا

The *Yusuf wa Zuleikha*—two celebrated love tales.

تحفة الاحرار

The *Tohfet al-ahrar.*

Besides these are many dissertations in prose on theological subjects. He dedicated a work on ethics, called the *Irshad*, to *Mahomed Khan*, second *Sultan* of the Ottomans. His seven principal works form a collection styled the *Heft Aurung*, the seven thrones.[*]

In the epistles of *Jámi* is introduced so much pure Arabic that, to the mere Persian reader, they are in many places utterly unintelligible. Mr. Lumsden in his elaborate grammar of the Persian Language, has adduced a remarkable example of the unlimited intermixture of the two tongues (Vol. I. P. 398), and has strongly recommended, what I believe most orientalists concur in, that the study of both languages should go on together. The introduction of Arabic to this extent is of modern origin, subsequent of course to the conquest of Persia by the Arabs. *Sadi*, whose study of Arabic in the college at Bagdad, was not confined, has done a great deal to render that tongue fashionable among Persian poets.

The *Bagh-i-Iram* and *Silsilah uzzaheb* of Jami are both written in the measure *Khafif Muktùa.* The *Leila wa Majnun* in the *Hazaj Ajzab Makbuz Makhzuf Musaddas*; and his *Yusuf Zuleikha* in the measure *Hazaj Makhzuf Musaddas.*

Ibn khatib,

ابن خطيب

Surnamed *Kaikhusro*, or *Taj uddin Ahmed*, flourished in the time of *Sultan Mahmúd Ghaznavi*, in the 4th century of the Hejira.

Jelal uddin Atiki,

جلال الدين عتيقي

Was living at the time the *Tarikh i Guzideh* was written, by the author of which work, *Bin Aber Bekr-Bin Ahmed-Bin Nasir Al Mastoufi-*

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[*] M. Antoine Galand, in his "Paroles Remarquables," speaking of Jami, remarks "Il a composé un grand nombre d'ouvrages, tant en vers qu'en prose, et l'on compte cinq Divans parmi ses Poesies, c'est a dire, cinq recueils complets de Gazels par ordre Alphabetique."

Al Cazvini, he is mentioned. The *Tarikh i Guzideh* was completed in 730 A. H. *Atiki* is noted for the beauty of his *Ghazels.*

غزل

از خاک کف پایت هر گرد که برخیزد
جانهاش فرو بارد دلهاش فرو ریزد
آن برق که سوز دعقل از ابر غمت تابد
آن بوي که جان بخشد از خاک درت خیزد
سوداي توام در خاک سرمست بخوا باند
بوي تو ز خاکم باز دیوانه بر انگیزد
از تو نبرم صدره چون عود گرم سوزی
دود دلم آید باز در دامنت آویزد
اي جان عتیقي کي با عشق بر آید دل
با شاه کجا یارا هر سفله که بستیزد

Ghazal.

From the sole of thy foot every particle of dust which arises,
Scatters the lives (of the beholders) and strews around their hearts.
The lightening that scorcheth up wisdom, flashes from the cloud of
 thy grief.
Odours imparting life, perfume the air from the dust of thy threshold.
It is the love of thee, that causeth me to slumber intoxicated in the dust;
And thy perfume that again arouseth me thence to madness.
Though thou wert to consume me with fire, I should not fly a hundred
 different ways like wood of aloes ;
But the smoke of my heart (my sighs) would come and cling to the
 skirt of thy robe.
O my life! when can the heart of *Atiki* separate itself from love of thee?
O my friend! how can a beggar contend with a king?

Jelal Beg,

جلال بیگ

Surnamed *Bakái,* was a poet of some merit, who lived in the time of the emperor *Akber,* by whose order he was put to death for having poisoned his father. He was a native of *Cashmir.*

Jelál uddin Cáshi,

جلال الدین کاشي

Or *Syed Jelal Uddin,* cotemporary with *Abaka Khan,* flourished in the 7th century of the Hejira. His *forte* was satire. In answer to some reproaches cast upon him by *Sádi,* he wrote a *Terji,*[*] of which the first couplet is given by *Al Cazvini:* it runs as follows, and has a mystic meaning:

بيت

منم مست ورند لاابالي
واين شيوه مرا هست لايزالي

Beit.

I am a drunkard and a debauchee I allow; but what matters it? Such is my habit and constant practice.

Jelal Diwáni,

جلال ديواني

Styled the second Aristotle. Notwithstanding *Diwáni's* skill in rhetoric and his enlightened expositions of abstruse subjects, his Persian historian declares him to have been mad; *i. e.* a poet. His works abound with metaphysical subtleties. He died A. H. 908 aged 70.

Jelal uddin Méilla i Rúm,

جلال الدين ملا روم

Author of the celebrated *Masnavi* bearing his name, and which comprises upwards of 30,000 couplets, was born at *Balkh* towards the commencement of the 7th century of the Hejira: he died A. H. 672, on the fifth day of the month *Jemàdi al Akhir,* at sunset. He is called by some, *Bin Mahomed al Balkhi ar Rúmi. Jámi* relates that from his fifth year this high priest of the *Súfis* was accustomed to discern spiritual apparitions; and forms from the other world, of beings usually veiled from human gaze—the recording angel—good genii—and the select spirits of mankind who are concealed under domes of glory—all became visible and assumed a definite shape.

The *Mouláne,* as he is often styled, like a pious Mussulman performed the *Haj* or pilgrimage to Mecca. On his travels he fell into the society of *Shaikh Ferid uddin Attar* at *Nishapore,* who gave him his *Asrar-Nameh,* or book of secrets: this the *Mouláne* always kept by him.

Seraj uddin Kounawi was one of the most learned men of the time, but as his ideas and those of our poet on theological subjects did not agree, sought every opportunity of mortifying him. Some persons reported to him that the *Mouláne* had been heard to say that he agreed with all the opinions entertained by the seventy-three sects into which the followers of Islam are subdivided. On this *Kounawi* sent one of his friends, a person of great acquirements, to the *Mouláma*, in the midst of a large assembly, to ask whether this were true; and, if so, to disgrace him publicly. He went, and on the *Mouláma's* acknowledging it, commenced a violent harangue filled with abuse and invective. The *Mouláma* patiently allowed him to go on until he was fatigued. When he had concluded, he smiled and calmly observed—" In all that thou hast just been saying I also agree." His reviler abashed and confused, retired.

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[*] A *Terji* is a kind of stanza, in which one line recurs at fixed intervals.

The following anecdote, from a number of others of the same stamp, may suffice to shew the manner in which these dreaming visionaries are accustomed to apply the external impressions of this sublunary world to the subjects of their own abstruse meditations. One day the *Mouláma*, seated among his pupils, observed, on hearing the sound of a *Rebab*, " the sound of that instrument is the melody of the gate of Paradise." A bystander of little faith, remarked, " I too hear the very same sound, but do not experience these glowing sensations." The *Mouláma*, in allusion to the scepticism of his adversary, exclaimed, " God forbid that you should! What *we* hear is the melody of the portals of Paradise *opening* for us: what *you* hear is the grating of them *closing* upon you." In his last illness *Jelal-uddin* thus addressed his intimates—" Be not sorrowful in that I am now about to depart from among you: inasmuch as *Nur Mansur* (the mercy of God on him), a hundred and fifty years after the termination of his mortal career, became visible to *Shaikh Ferid uddin Attar*; and remained with him continually as his spiritual guide. Under every circumstance be ye with me, and keep me in remembrance, in order that I may extend your welfare in every state of existence (lit. in every dress) in which my destiny may place me. There are now only two links that bind me to this world: the first, obedience to the will of God—the second, yourselves. When, through Almighty grace, I become a simple elementary being, and the world of indivisibility shall have opened on my view, the tie which attaches me to you will still remain."

When *Shaik Sadi Uddin* (may God purify his inward state) came to see the dying poet, he ejaculated, " May Allah grant you a speedy recovery and advance your dignity." *Jelal uddin* replied, " May God also effect your cure. Between the lover and his mistress there now remains nought but a thin garment. Would ye not that light unite with light?"

بیت

من شدم عریان زتن وازخیال
میخرامم درنهایات الوصال

Beit.

I am emancipated from the body and from vain ideality—and walk erect in the reality (of the joys) of union. On hearing this the *Shaikh* and his friends began to weep. The *Moulàna* consoled them and said,

مصرع

چه داني توكه در باطن يارے همنشين دارم

Misra.

Do you not know that I possess inwardly a constant friend?

His last injunctions to his disciples and friends are as follow: "These are my last precepts to you—Be ye pure before God both in private and in public—eat sparingly—sleep sparingly—and speak sparingly. Flee from wickedness and crime—be constant in fasting, and assiduous in uprightness. Abandon fleshly lusts, and endure with patience the tyranny of men. Shun the society of the ignorant, and cultivate that of the virtuous and meek; for assuredly the best of mankind is he that benefits his fellow creatures, and the best of language is prayer and praise to God.

On his disciples desiring him to appoint a successor, he said, "Appoint Chelbi Hussain Uddin." He repeated this three times. On their asking him his wishes with regard to *Sultan Walid*, he answered, "Walid is a warrior and needeth not advice." Chelbi then asked who should perform his burial service—he answered, "*Sadr-uddin.*" His last words were these—"My friends draw me one way and *Shems-uddin* another. Listen, O my tribe to him that calls upon the Almighty. I now am compelled to quit you." The poet then placidly yielded up his spirit into the hands of Him that gave it, just as the sun went down. The beauty and pathos of his dying injunctions, and the Socratic composure of his last moments, will scarce be excelled by aught that modern or ancient history can offer.

The following are the opening lines of his celebrated *Masnavi*, elegantly paraphrased by Sir William Jones:

مثنوي

بشنوازني چون حكايت ميكند
وزجدايها شكايت ميكند
كزنيستان تا مرا ببريده اند
ازنفيرم مرد وزن ناليده اند

سینه خواهم شرحه شرحه از فراق
تا بگویم شرح درد اشتیاق
هرکس کو دور ماند از اصل خویش
باز جوید روزگار وصل خویش

" Hear how yon reed, in sadly-pleasing tales,
Departed bliss and present wo bewails !
With me from native banks untimely torn,
Love-warbling youths and soft eyed virgins mourn.

O ! let the heart, by fatal absence rent,
Feel what I sing, and bleed when I lament :
Who roams in exile from his parent bow'r,
Pants to return, and chides each ling'ring hour."

The *Masnavi* is written in the measure, *Ramal Musaddas Maksúr.*

Jelal uddin Rouzet-i-Bahar,

جلال الدین روضة بهار

Flourished during the reign of *Yacúb,* king of Persia. He is author of a poem, entitled the *Temárat al Ashgiah.*

Jehangir Padshah.

جهانگیر پادشاه

This monarch is included by the author of the *Tazkiret-i-Serkhúsh* in his catalogue of poets, and no doubt possessed considerable talent for poetry, as numerous couplets and stanzas, quoted as his extempore effusions, attest; though it does not appear that the royal amateur ever achieved any thing like a regular poem.

The memoirs of his life penned by himself are well written and evince much observation and ability. *Jehangir* ruled in Hindustan from A. H. 1014 to 1037, when he died, according to Dow, on his way to *Cashmir* in the 58th year of his age.

Tavernier speaks very highly of his " illustrious queen," the *Bégum Núr Máhal,* and gives an engraving of the pieces of money coined by her command, during the twenty-four hours of imperial sway granted her by the emperor. She could read, write, and compose in Arabic, Persian and Hindi. One day seeing the emperor in a vest fastened by a ruby of uncommon lustre, she improvised this couplet :

بیت

ترانه تکمهٔ است برلباس حریر
شدهٔ است قطرهٔ خون منت گریبان گیر

Beit.

That is not a ruby that sparkles on thy silken vest;
But a drop of my blood that clings there.

Núr-Mahal was the daughter of a poor Tartar chief named *Khajeh Aiass.* She was eminently beautiful and accomplished, and possessed great influence over *Jehangir's* councils. After her marriage her original name *Mihr-unnissa,* or the sun of women, was changed for the appellation—*Núr-Mahal,* light of the Haram—which was subsequently laid aside for the more imposing title of *Núr-Jehán,* light of the world.

Jemaluddin Abdal Rizak,

جمال الدین عبد الرزاق

Cotemporary with *Khacáni* and *Assir Uddin*; and father of the celebrated poet *Kemal uddin Ismail.*

Jemal uddin Astozi,

جمال الدین استیزي

Of Tabriz, where he died--his remains were interred at the *Mukbarat-us-Shóra.* He was accounted a good poet.

Jemal uddin-Ben-Ishak,

جمال الدین بن اسحاق

Author of a poem entitled, *Ganj. al Ishtiha,* the treasure of desire.

Jemal Dehlawi,

جمال دهلوي

Was one of the courtiers of *Sultan Secunder Bin Behlol.* After this monarch's death, he turned traveller and visited many regions, performed the pilgrimage to Mecca, and stayed some time at Herat with

Moulavi Jámi, "by whose spiritual advice he profited much." Subsequently he visited Hindustan, and entered into the service of the emperor *Humaiyún.* The *Sair al Arifein* was compiled by him. He was called the *Khusro* of Hindustan.

Jemal Resek al Ghaten,

جمال راسخ الغطن

Al Ghaten is a quarter of the city of *Cazivin,* in the dialect of which, this poet's works are composed. He died in the reign of *Abaka Khan,* at the advanced age of ninety. No mention is made of his works.

Imámi,

امامي

A native of *Herat,* his proper name is *Abdullah Mahomed Ben Aber Bekr Asman*—he sung the praises of the sultans and viziers of *Kirman.* He died during the reign of *Abaka Khan.*

Jaffer or *Asef Khan,*

جعفر

He flourished during the reign of the emperor *Akber,* to whose court he repaired from his birth place *Cazivin.* His works are a *Másnavi,* entitled *Khusro-i-Shirin,* and a *Diwan.* There is another poet of this name, who flourished in the time of *Alumgir,* and composed a *Diwan.*

Judai.

جدائي

This is the surname of *Mir Syed Ali,* who was "one of the wonders of the age" during the reign of the emperor *Akber.* He completed the historical romance of *Amir Hamzeh* in sixteen volumes; every volume of which, according to his biographer *Mahomed Bukhtawer Khan,* is as large as a chest—every leaf, a cubit in length, and every page adorned with a likeness of the *Amir.*

XII.—*An Essay on the Relationship of Languages and Nations.—By the Reverend* BERNHARD SCHMID.

The idea of ascertaining the relationship of nations by comparing their languages, is peculiar to the learned of modern Europe; and, if carried on in a philosophical spirit, and according to sober and well substantiated rules of etymology, it cannot but afford most important clues, and lead us to very unexpected historical and antiquarian discoveries. Such a study of languages may well be compared to the equally modern branch of human inquisitiveness, the study of fossil remains of a former world, of which the examination of the *Sivatherium*, in the 12th number of the *Madras Journal of Literature and Science*, contains so instructive and interesting a specimen.

The design of the present paper is merely to suggest some authenticated hints, in what quarter and by what methods philologico-historical discoveries may be made; in hopes that those who have more leisure and literary means, will pursue these inquiries, and communicate their remarks to the literary public.

1.—Those who have directed their attention to the study of a comparison of languages are agreed, that a conformity of the *grammatical* part (the inflexions of the conjugations and declensions), is one of the most infallible proofs of the near relationship of languages. If this is correct, the *Armenian* language will be found to occupy a most important place in our inquiries; as will be apparent from the following statements:

Armenian Auxiliary Verb.		*First Conjugation.*		*Terminations of the 4 Conj. in Armenian.*	
em,	I am	es sirem,	I love	em,	active
es,	thou art	tu sires,	thou lovest	am,	neuter
é,	he is	na siré,	he loves	um,	reciprocal
emk,	we are	mek siremk,	we love	im,	passive
ek,	you are	tuk sirek,	you love		
en,	they are	noka siren,	they love		

Before I proceed, I would just observe that the Armenian auxiliary, although preserved only in fragments in other languages, seems to have been the basis of all the Indo-European conjugations; the terminations of the Armenian conjugations, or rather modifications of the verb, are remarkably simple, regular, consistent, and evidently formed by the same people who formed the other inflexions, without interference and immixture of other languages.

2.—But there are also various *words* which throw an important light on the question, and prove that the Armenian is a very interesting middle-link between several Indo-European languages; e. g. mietz (great) preserved in Greek, in the form of *μειζων*, and in Latin, in the superlative *maximus*;—aïl = *αλλος*, *alius*;—akaraḥ* (a ploughed field), in German *acker*, *αγρος*, *ager*;—kuḥ (a cow), in German kuh, and (what is remarkable) the plural of it, in the Thüringian, and high (or mountainous) Saxon provincial dialect, is Küḥe* (in Sanscrit, Tamul and Persian, *ko*); *ór*, pronounced *wur*, (fire), *uro*, *comburo*, (the Armenian pronunciation of *or*, viz. *wur* or *vur*, explains how the letter *b* could come into the Latin compound); from *vur* comes the Dutch *vuur*, the uu, or long u being sounded in Dutch as the French ü, the similarity with *πῦρ* in Greek, is the more striking; *feuer* in German is merely another modification of the same sound; hence, the English *burn*, = *brennen* in German. Not to mention, that the Armenian *or* and *ur* will strike every one as being identic with the Hebrew אוּר (*ur*, *fire*) and אוֹר (*ór*, light)—astḥ (a star)= *αστηρ*, aster;—*mi* in Armenian means 1st, one = *μια*; 2d, lest, = *μη*;—gin = *γυνη*;—nyu a woman, always in the signification of *nubere*, or *nupta*; (the derivation of *nubere* from *nubes* always appeared to me far-fetched and unnatural). Also in Chinese, I am told, the same root means *a woman*. *Sinear (Shinar)*=an assemblage of men; *kar* (a stone) *χερμαδιον*; *mart*, means 1. a man (= *mas*, *maris*); 2. *a* battle, 3. the god *Mars*, (*Martis*).

3. *Comparison of Conjugations.*

Armenian.	*Hungarian.*	*Bohemian.*	*Latin.*	*Greek.*	*Brettany.*
Luanam	irok, irom	wolam	do	*τιμαω*	kanann
luanas	irsz, irod	wolash	das	*τιμας*	kanez
luanaë	ir, irya	wola	dat	*τιμα*	kan
luanamk	irunk, iryunk	wolame	damus	*τιμαομες*	kanomp
luanak	irtok, iryatok	wolate	datis	*τιμᾶτε*	kanit
luanan	irnak, iryak	wolagi } wolau }	dant	*τιμαοντι*	kanont
λεω lavo	I write, I write it	I call	……	……	cano

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* It is undeniable that the Greek termination of *os* corresponds to the Sanscrit *oḥ*, and also that the sound of the Greek χ and of the Scotch *ch* is often originated from the single aspirate sound of h, or substituted for it; hence the propriety of using the *h* with some diacritical mark, to express the Greek χ or Scotch ch, seems to be evident.—In cases like the present, where it is important to inform the reader of the exact pronunciation of foreign words, it is evident that diacritical marks are necessary, as *h* with two or three dots underneath, is doubtless the most suitable, to intimate the near relationship of the sounds of *h* and χ or the Scotch *ch*.

Remark 1.—The general agreement of the Armenian with the Hungarian conjugation, especially in the plural, is surprising. It evidently shows that the Hungarians must have come from the Himalayan range, and it must powerfully draw the attention of the public to the Tibetan researches of Körös, the learned Hungarian.

Remark 2.—The Bohemian appears to be an equally remarkable middle-link between the Armenian and the Sanscrit tribe (Greek and Latin). To save room, I have omitted in this synopsis the Sanscrit; the similarity of which with the Greek and Latin is well known, as *dodami, dodasi, dodati, with* διδωμι, διδως, διδωσι, and with *do, das, dat*; especially if we remember the subjunctive, *dem* or *legam*, where the original letter of the first person, *m*, re-appears. (It scarcely needs mentioning, that I have purposely put τιμαομες or τιμωμες and τιμαοντι according to the Doric dialect, instead of τιμωμεν, &c., in order to make the uniformity more evident).

Remark 3.—The agreement of the conjugation of the language of Basse-Bretagne may be owing to Latin immixture, unless other facts prove this language to be an *independent* Celtic dialect.

Remark 4.—The other tenses of the *Armenian conjugation*, having the letter *z* as a distinctive mark of the first past tense, and of the future, agree with the Greek in a remarkable manner. I add also the perfect tense of the dialect of Basse-Bretagne, as being analogous.

4. *Armenian Conjugation of the other Tenses:*

1 Past.	Sirezi, sirezir, sireaz, sirezak, sirezik, sirezin.
2 Past.	Sirealem, sireałés, sirealê, sirealemk, sireałek, sirealen.
Plup.	Sirealêï, sirealêïr, sirealêr, sirealéak, sirealéik, sirealéin.
Fut.	Sireziz, sireszis, sireszê, sireszuk, siresjik, sireszen.

Conjugation of Brettany.

Perfect.	Kaniz, kanzoud, kanaz, kanzomp, kanzot, kanzont.

Remarks.—In the Bohemian language, as well as in the Armenian, the participle of the past tense terminates in *l*: e. g. *wolal gsem*, I have called (strictly, I called having am). Every where a remarkable analogy! Neither can I omit mentioning, that the letter *r* of the 2d person of 1st past tense, and the 2d and 3d persons of pluperfect, sirezir, sirealêir, and sirealêr, reminds one of the Latin subjunctive, as: *audirem, docerem, docuerim;* as also the third person plural, sirezin, sirealin, of docuerint, riserint. I cannot believe that this is mere accident; but whether a tribe, nearly related to the Armenians, *imported* into Italy these fragments of their conjugation, or whether the Romans, being a branch of the great Caucasian, or rather Himalayan race, after having settled in Italy, through congeniality of mind and language, *formed* their conjugation so analogously, I am not prepared to say.

5.—Also the Bohemian, Greek and Latin *declensions* are very analogous to the Armenian ; e. g.

	Armenian.	*Bohemian.*	*Armenian.*	*Latin.*	*Greek.*	*Bohemian.*
Sing.	(Thing)	(door)	(Seed)	......	....	(a young cat)
N.	Pan	brána	sermn	semen	σπερμα	kotyé
G.	pani	brány	serman	seminis	σπερματος	kotyete
D.	’ipan	branyé	’isermn	semini	σπερματι	kotyeti
Acc.	z pan	branu	z sermn	semen	σπερμα	kotyé
Abl.	’ipaniv	......	’isermene	semine	....	
Local.	’ipani	u brányé	’iserman	......	....	u kotyeti
Circum-ferential	z pani	......	z serman	......	....	
Instr.	’ipani	s bránau	’iserman	......	....	s kotyatem
Plural.						
N.	Pank	brány	sermank	semina	σπερματα	kotyata
G.	panitz	bran	sermanz	seminum	σπερματων	kotyat
D.	’ipans	bránám	’isermans	seminibus	σπερμασι	kotyataum
Acc.	z pans	brany	z sermans	semina	σπερματα	kotyata
Abl.	’ipanivk	......	’isermanpk	seminibus	....	
Loc.	’ipanitz	u branaḥ	’isermantz	......	....	u kotiateḥ
Circ—	z panitz	......	z sermantz	......	....	
Instr.	’ipans	s branami	’isermans	......	....	s kotiatami s kotiaty

It seems scarcely credible that nations, so remote from each other, and living in so very different climates and countries, should have preserved so great an analogy in their dialects. Even if the similarity of some inflexions of the Armenian and Latin verbs were granted to be merely accidental, it is impossible to fancy that these declensions, also, are thus similar to each other by mere accident. The nations who speak, or spoke, these languages *must be branches of one and the same tribe.*

The *v* in the Armenian ablative, changed into *p* in the plural, by its position between two other consonants (in ’*isermanpk*) shows clearly that the ancient Greek φι (in στρατοφι, κεφαληφι, στηθεσφι), and the Latin *bus* (also in *deabus*), are identical inflexions, as well as of quite similar form in Sanscrit ; and grammarians need tell us no longer, with their wonted gravity and confidence, that φι is a " particula enclitica," unless they are prepared to maintain, that *bus* in Latin, and *v* and *pk*, are also enclitical !

6.—The *Numerals* are likewise an important means of ascertaining the relationship of nations, although not equally infallible; since one tribe may be induced to adopt them from a quite foreign nation; as is the case with the Tamulians, who have borrowed the Sanscrit numerals, although they use *commonly* their own original ones, and thus cases may likewise occur, of tribes losing their own numerals entirely and exchanging them for those of foreigners.

As a comparison of the numerals, however, may be useful to suggest various other instructive philological observations, a list of them follows here, adding the personal pronouns in opposite columns, for reasons which will appear immediately.

The numeral *One*—	the pronoun *I*.
Ici, Japanese	ya { Russian, Polish, Wendish.
ye, Chinese	
djigh, Thibetan	
yak, Persian	
yek, Gipsy	ick, low Germ.
hek, Multan	εγω
ök, Bengal	ego
egam or eḥam { Sans. according to Tamil orthog.	aham Sans.
	ich German, pron. iḥ
	anoḥi, Hebrew.
	ga or ya, Bohem.
eka, Sanscrit	
egy, Hungarian	
äḥad Hebrew	
ahad, Arab.	
geden or yeden } Boh.	
unus, Latin	on (I) om (we) { Abor. of Neilg.
one, English,	
in, ihn, Welsh	
ein, eins, Germ.	ana { Arabic, Abyss.
	en, Hungarian.
εις, ἑν	es, Armenian.
μια,	ma, (we) Pehl.
	mi, (we) Hung.
	mi, Armenian.
	my, (we) Bohem.
oru, ondru } Tamul.	mö, amö, Gipsy.
	ammi, Hindost.
vonnu, onnu, } Karn.	αμμες, Doric.
	ημεις,

Numeral *Two*—	pronoun *Thou*.
Ul, China	ni, Tamul.
ni, Japon	tu, { Pehl., Mul. Bengal, Gip. Arm., Latin.
gniy, Thibet	
do, Persian	
dua, Afghan	
dui, Gipsy	tui, Russian.
dwa, Sanscrit	ty, { Pol., Wend. Bohemian.
tuvi, { Sanscrit in Tamul orthogr.	τυ, Doric.
δυω,	du, German.
duo,	zween, zwo, zwei, } Germ.
twitioh, Sanscr.	
zweite, German	
δευτερος,	bai, bos, ba (both), { Gothic.
dwa or dva, Boh.	
twaer, two, Icel.	baioth, Gothic.
du, bagh, Pehlvi.	αμφοτεροι,
besh, Zend,	ambo.
bis, Latin	
dowa, Malay	
loua, Cocoa-Islands.	
rua, Taheiti	
shnaim, Hebrew	anta, Arab, Abyss.
isnan Arabic,	enti, Maltese,
tnein, Malta	attḥa, Hebrew.
kettö, Hungar.	
ergov, Armenian.	
irendu, iru, Tam.	
iradu, Karnataka.	

Remarks 1.—I do not think, that the Chinese numeral, *ye*, and the Slavonian pronoun *ya*;—that the Arabic, *ana*, or the Hungarian pronoun

en, and the numerals *ein* or *ἓν*;—that the Tamul pronoun *ni*, and the Japanese numeral *ni*, have any connexion together. Many similarities in this list may be accidental, but *the general analogy of the numeral and the pronoun is very curious.* Should we not nearly be led to form the hypothesis, that the two or three most ancient languages had had each only one identical word for the numeral *one*, and for the pronoun, *I*, —and another word for the numeral *two*, and for the pronoun *thou*—but that in a subsequent revolution these words were confounded, just as the fossil bones and shells of widely different creatures, have been thrown together confusedly at Montmartre? The Sanscrit *egam* or *eḫam*, a numeral, has in Greek, Latin and German been employed not as a numeral, but only as a pronoun. The same is the case with the Greek *ἓις* and *ἓν* and the Hungarian and Bohemian *en* and *es*; *an* is the root of unus, *ἓις*, ein and one; but it looks as if indeed the Arabians and Abyssinians had employed it for *their* pronoun, and as if the Hebrews had joined it to the root of their own numeral äḫad, and formed anoḫi.

2. If it is true that human language is a faithful mirror of the human mind, and that scholars well acquainted with different nations, can trace the characters of a nation in their language, and draw often striking parallels between the idiom of a language and the peculiarities of the nation, it must be acknowledged also, that the above list exhibits an intuitive exemplification of the humiliating truth that man, in all ages and climes, considers his dear self, (his *ego*) as *Number one* (or egam), and the neighbour with whom he has to deal (*tu*) as *Number two*? Even the best of men, the most noble-minded and most generous, will catch his heart frequently at the attempt (although a hidden and refined and disguised one), to exalt *ego* over *tu*, and to transgress the great law of Him, greater than Solomon, who said, "love thy neighbour as thyself;" "do to others as thou wouldst be done by;" or "look not every man on his own things, but every man also on the things of others."

3. Gellius has a pretty remark on the pronoun (L. X. Ch. 3): "Nomina verbaque non positu fortuito, sed quadam vi et ratione naturæ facta esse P. Nigidius in grammaticis commentariis docet, rem sane in philosophiæ dissertationibus celebrem. Quæri enim solitum apud philosophos, *φυσει τα ονοματα ἦ θεσει*. In eam rem multa argumenta dicit, cur videri possint verba naturalia magis quam arbitraria; ex quibus hoc visum est lepidum et festivum: VOS, inquit quum dicimus, motu quodam oris conveniente cum istius verbi, demonstratione utimur et labias sensim primores emovemus ac spiritum atque animam porro versum et ad eos quibuscum sermocinamur intendimus. At contra quum dicimus: NOS, neque profuso intentoque flatu vocis, neque projectis labiis pronunciamus, sed et spiritum et labias, quasi intra nosmetipsos coercemus. Hoc idem fit et in eo, quod dicimus Tu, et Ego, et Tibi, et Mihi. Nam

sicuti quum adnuimus et abnuimus, motus quidem ille vel capitis vel oculorum a natura rei quam significat non abhorret: ita in his vocibus quasi gestus quidam oris et spiritus naturalis est. Eadem ratio est in Græcis quoque vocibus, quam esse in nostris animadvertimus." If these observations are correct (of which I have no doubt), the pronouns have been formed first, and then made use of (mostly with a modification of the sound and of letters) as numerals likewise.

4. It is evident that the word, *doubt*, comes from the word *two*; for just as the Tamulians changed the Sanscrit *dwa* into *tuví*, the Latins changed *duo* into *dubito*, i. e. to be or to hesitate between *two* things; and, according to the same analogy, the Germans have derived from *zwei*, the word, *zweifeln* i. e. *dubitare, to doubt.* The word *between* comes from the same root (zwei or dwa), pronounced in Nether Saxony, tween or twén.

7. *Numeral*, 3.

San, Jap. China.
sùm, Thibet
se, si, Zend, Pers.
tri Sanscrit
tiri in Tamul orth.
trin, Gipsy
trai, Multan
tri, treḥ, Bohem.
τρεις, τρια
tres, tria
drei, German
three,
dri, Welsh
tritioh, Sanscrit
dritte, German
τριτος,
tertius,
third,
shelosh Hebrew
shloshah
selaset, Arabic
tlieta, Maltese
tola, N. Guiana
tolu, Solomon & Cocoa-Isl.
toru, Taheiti
harom, Hung.
erek, Arm.
múndru, Tamul
mùru, Karnataka

Numeral, 4.

Xi, su, Jap. China
ji, Thibet
čatverè, Zend
četro,
chatur, Sanscrit
sadur, Sanscrit Tamul orth.
čahâr, Pehlv. Pers.
čâr, Multan, Beng.
shtar, Gipsy
styri, Wendish
čtery*, Polonian.
čtyrči, Bohem.
shors, Armen.
dört, Turk.
τεσσαρες
τεττορες Doric
πιτορες
πισυρες ancient Greek and Aeolic.
pedwar or peduor Welsh,
fiorer, Icelandic
four,
vier, German.
negy, Hung.
arba, Hebrew
nânku, Tamul
nâlu,
nâlku, Karnataka

Numeral, 5.

U, China
go, Japan
nga, Thibet
panj, Persian, Gipsy.
panjam Sans. in Tamul.
besh, Turkish
pet, Bohem.
πεντε
pump, pimp, Welsh
fünf, German
fimm, Icelandic
five,
hing, Armenian
quinque
öt, Hungarian
ḥamash, Hebrew
ḥamsa Arabic and Maltese
summus, Berbers in Africa
rima, Moses Isl. Tahiti
lima, Solomon and Cocoa-Isl.
eindu, Tamul.
anju, vulgar Tamul.
eidu, Karnataka.

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* In the Bohemian, and other Slavonic dialects, the English sound of *ch* and *tch* is expressed by a *c* with a diacritical mark, and in the Italian, by a simple *c*; the *c* with a circumflex appears the most suitable letter to express the sound, and to avoid ambiguity in a treatise on foreign languages.

Remarks referring to the *numeral* 3.—Also this numeral has in a few of these languages some similarity with the 3d person of the pronoun.—*Ur* (we) in Hungarian, may possibly be the root of the numeral *harom*, as well as *har* (= her) in the Thüringian provincial dialect; and ér (he) in German, may perhaps, as well as *ur*, be the root of *erek*.—Sie (= she) German, may be identic with the Zend and Persian numeral se, si.

Trin[*] in the Gipsy language seems to form the transition from the Sanscrit *tri*, to the Hindostani *tin*.

Remarks on the numeral, 4.—The forms τεσσαρες, πιτορες, peduor and quatuor, shew us evidently, how the same root may be diversified and corrupted in different languages and dialects. Even the forms, fiorer, four and vier (pronounced fîr), appear to be corruptions of πιτορες by dropping the letter τ, just as the Persians have changed the *t* into *h*, (we might as well say, dropped it) in the Sanscrit, *čatur*, or the Zend, čatveré; or in a similar form of the same word in some other cognate ancient dialect.

Busbeck, a learned Dutch ambassador at the court of Constantinople, has in his operibus (Epistolis Turcicis) Amst. Elzev. 1660, an account of some men, whom he met with at Constantinople, and whom he believed to belong to *a very ancient* German colony in the Crimea. He gives a list of words of their dialect, many of which are evidently Teutonic, others belonging to quite a strange language. The numerals are: 1, ita, (in Icelandic: einr (masc.) ein (fem.) *eitt* (neuter); 2, tua; 3, tria; 4, fyder; 5, fynf; 6, seis; 7, sevene; 8, athe; (Icelandic ath).—*Fyder* is an important middle-link between πιτορες, peduor, fiorer, four and vier, and shews that the Teutonic *four* and *vier* are corruptions of πιτορες as well as the Persian chahar (čahar) is a corruption of chatur (čatur).

Remarks on the numeral, 5.—Just as the English have dropped the letter *n*, in the German *fünf*, and say *five*, so the Turks have dropped *n* in panj, and say, besh; and the Bohemians, according to the same analogy, have dropped the *n* in πεντε and formed pet (or rather p^{i}et the pi being p mouillé), neither can I doubt that panj, πεντε, pimp, fünf, and five on the one hand, and *hing* and *quinque* on the other, are all of them, modifications and corruptions of one and the same root. The change, in sound, from *quinque* into *cinq* in French, makes this very probable.[†]

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[*] I am not sure, however, whether my manuscript is here correct; perhaps the Gipsy word might be *triu*; for the materials contained in this treatise were collected more than 20 years ago, in Germany. Since that period, I had more important duties than "to ask every word for its passport, to know, whence it comes, and whither it goes."

[†] I do not mean to say that the Bohemians have *borrowed* their form of *pent* or pet (p^{i}et) from the Greeks; but the Bohemians, as well as the Greeks, have either received this word from a tribe of middle Asia, from which both these nations branched out, or they (the Greeks and Bohemians) changed the (probably) original word *panj* (after their separation) analogously into πεντε and pent or p^{i}et. This remark is applicable to many similar cases throughout this essay.

The English word, *pinch*, i. e. 1st, what can be (or is) taken with the five fingers; 2d, a squeeze with the (five) fingers, comes evidently from the Sanscrit and Persian word, *panj*: and if this is granted, it cannot be so very improbable, that also the word, bunch, i. e. a number of things tied together or united, (a cluster of dates, plantains) *like fingers*, comes likewise from *panj*. I must not omit mentioning that the word, *pincers* ("frequently mispronounced *pinchers*," as Walker says in his pronouncing dictionary), comes from *panj* likewise, and that the pronunciation *pinchers* is consequently *etymologically correct*, since the French have changed the word *panj* into *pince*, *pinceé* and *pincer*, in all which words the idea of a *pinch* with the (five or less) *fingers* is prominent; e. g. *les pinces*, the hands of a crab; *une pincée*, 1st, what is, and can be, taken with some fingers, 2d, the little foot of an animal, &c.

If we consider that *panj*, πεντε, *fünf* and *hing*, are links in one chain of modifications of one root, we shall not think it an extravagance, to consider the word, *finger*, as a link of the same chain, and to believe that it means nothing else but *five*. Just so δακτυλος comes from δεκα, and in German, the word Dachtel (pronoun. Daḥtel) means a slap in the face *with the open hand*, or with the *fingers*, *not with the fist*. Δακτυλος means also, fructus palmæ, i. e. a *bunch* of dates. *Digitus* is only a softer pronunciation of δακτυλος, viz. δακιτ (υλος) or δαγιτ (υλος), and comes likewise from δεκα or decem (correctly pronounced *dekem*).

8. *Numeral* 6.	*Numeral* 7.	*Numeral* 8.
Lo, rocu Ch. & Japan.	Tsie, xici, Ch. and Jap.	Pu, faci. Ch. and Jap.
dhruh, Thibet	dûm, Thibet	ghiä, Thibet
alty, Turkish	saptam, Sanscrit and Tam.	ashta, Sanscrit
vietz, Armen.	sattam, Sanscrit Tamulized	hasht. Pehlvi & Pers.
shashta Sanscrit	septem, Latin	
shest, Bohem.	soptomoh, a, on, Sanscrit septimus, a, um	
shestsh., Wendish		
shash, Persian	ἑπτα	oḥto, Gipsy
sex Latin.	haft Persian	οκτω
ἑξ	efta, Gipsy	octo, Latin
	sept, French	acht, (pron. aḥt) German.
sechs (pron. sex) German	sedm, Bohem.	eight, Engl.
chwch (pron. ḥuäḥ) Welsh	sais, Welsh	with, Welsh
hat, Hungar.	hét, Hungar.	huit, French

shesh } Hebrew
shishah
shedesh, { most ancient Hebr.
sittat, Arabic
sádisa (the sixth) Arab.
sitta, Maltese,
âru, { Tamul and Karnat.

yotn, Armenian
yedu, Turkish
hetu, Tahitian.
fita, { Cocoa Isl. New Guinea
wythou, Moses-Isl.
shibʿah, Hebrew
sabʿat, Arabic
sebgha, (sebʿa) Malta
sieben, German
seven, Engl.
siö, Icelandic
öṛu, } Tamul
ölu,
elu, Karnat.

shmini, Hebrew
samániyat, Arabic
tmegnia, Maltese.
niólz, Hungarian.
osm, Bohem.
utn, Armen.
öttu } Tamul.
entu, Karnataka.

Remarks—1. I have compared the numerals of other nations, certainly not related to the Caucasian race, and have not found the least approach to an analogy, except those few which occur in the South-Sea-Islands. Some such numerals are the following :

Chili. 1., Agga 2., Eppo. 3., Quita. 4., Meli. 5, Quecku. 6, Cuyn.
Mexico : Ce. Ome. Iei. Nahny.
Viginia : Negut Neesi Nish. Yau. Napan Negutta
Karonas { t'r ko. } t'r koam. t'n nonna. hakka. natahshe tahshe
Hottentots { eit }
Africans near the river Camerones. } Mo. Ba. Melella. Meleg. Matan, cet.

2. The preceding list of the numerals of the Caucasian race, shows that the roots of the numerals *three* and *seven*, have spread farthest, even to the South-Sea-Islands. It is remarkable that just these are the sacred numbers, and this fact may be considered as a collateral proof that Noachic traditions were preserved long in the minds even of nations so remote. Moreover we find that the root of the numeral *seven*, or *shibgha* (Heb.) occurs in several Indo-European or Caucasian languages, expressing sacred actions ; e.g. *sevyoti* in Sanscrit, and *svetit* in Slavonic, mean, *he worships ; σεβειν* in Greek means the same ; *sebam* (செபம்) in Sanscrit and Tamul means *prayer ;* even *sabbath* appears to be derived from the same root and to have meant originally "*the seventh day's rest, the sacred rest ;*" although in the Hebrew, as far as that language has been preserved to us in the Old Testament, the verb

shabath with some of its derivatives means merely *to cease from work, to rest,* likewise *to come to an end.*

9.—That also with respect to a variety of other words, there exists a close connexion between the Sanscrit, Greek, Latin and German languages, is well known to those who have made this branch of human knowledge the particular object of their enquiries, but I shall add here a list of Sanscrit words with their derivatives, in order to convince the uninitiated of this, and to draw the attention of scholars more generally to the comparative study of languages and dialects, especially of those in India, or connected with this country, principally Sanscrit, Armenian, and the provincial dialects in the north of India or in the Himalayan and Caucasian range of mountains; because by such studies much unexpected light may still be thrown on ancient history.

Onto[*] (Sanscrit,)	andam (அநதம, Tamul), das ende (Germ.), the end.
oshono,— ——,	asanam (அசனம, Tamul), das essen, the eating.
vidova,	veduvei (வெதவை, Tamul), vidua, widow, wittwe (Germ.)
vohoti,	vehit;—hence:
vahanam,	vaganam or vahanam (வாகனம, Tamul), wagen (Germ.) = waggon.—Vaganam, corresponds exactly to the Latin, *vehiculum,* consequently this last word and *waggon* must be allowed to come from the same (Sanscrit) root.
vindoti,	er findet (German) = he findeth.
valo, (Sanscrit)	strength, = bala (Karnataka,) palam (பலம, Tamul), validus, valde;—bold,—balde, (quick, in German).

Likewise osti=*οστεον*=os, ossis;—oshion=os, oris;—vortute=vertitur; yunkte, = jungit and jungitur;—nidhi = nidus = nest;—modhyoh, medius, = *μεσος* = mid, middle = mitte and mittel (Germ).

Ondani, die enten (German) ducks. Tandovo = der Danz = dancing. Torsho = thirst = durst (Germ.) the root of which is probably, dürre (Germ.) = dry.—Ognih = ackini (அககினி, Tamul)=ohén (n mouillé, Bohem.) = ignis.—Rotho = radam (ரதம, Tamul) = das Rad

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[*] The Sanscrit words occurring in the whole of this treatise, have been taken from the ingenious and elegant work of Frederick Schlegel "On the Language and Wisdom of the Hindus" (adopting his orthography). This work first directed my attention to the treasures of Sanscrit literature; whilst another acute and eloquent philological writer, the Rev. Mr. Breidenstein, Ecclesiastical Councillor, and Chaplain to the Landgrave of Hesse-Homburg, led me to the comparative study of languages, and I gladly seize this opportunity to acknowledge that nearly every idea contained in my former treatise "On Original and Derived Languages," I owe to the latter gentleman.

(Germ.) = rota.—Yanu = *γονυ* = genu = knie (Germ. pronouncing the k,) = knee, (Engl.)—Rohito and roktoh = roth (Germ.) = red; hence *ροδον* = rosa; hence russus, rouge (French); also rutilus. From rohito and roktoh comes likewise rettam (ரெத்தம்) and rektam (the blood) in Tamul;—naso = nasus = Nase (Germ.) = nose; nasi (நாசி in Tamul) = nostrils = nares.—Bhruvo = brow (of the eye) = braue (Germ.) = *οφρυς*. Namo = namam (நாமம், Tamul) = nomen = nâme (Germ.) = name (Eng.) = *ονομα*.

Monushyo = manushen and maniden (மனுஷன் and மனிதன் Tam.) = Mensch (Germ. pron. mensh). The root of it, man = mann (Germ.) exists perhaps also in Sanscrit; it is disguised in homo, *hominis* or in ancient Latin, *hemonis*, the *he* and *ho* being prefixed just as the Greeks do in some preceding instances; and the root, *man*, re-appears clearly in the compounds *immanis*, *communis* (*i. e.* what belongs to all men) *nemo*, *neminis* = *niemand* (Germ.) and probably in *humanus*.

Purushen or burushen (புருஷன், in Tamul, also in Sanscrit,) a husband, also *un homme fait*, has preserved itself only in the German word, bursche, pron. burshe, a young (strong) man.

Yugon, = jugum, = joch (Germ. pron. yoḥ) = yoke = *ζυγον*.

10. *Etymological Rules.*

The science of Etymology has been ridiculed as "changing consonants at pleasure and disregarding vowels entirely," but *then it is no science*, and I should be sorry if the present essay contributed to increase the attempt into which etymology has been brought by the dreams and hallucinations of some scholars, who have (*e. g.*) boldly derived *Mareschal* (*i. e.* Mareschalkus, the servant of horses, or the overseer of the royal stables), from the Hebrew, *mashal*, *to govern*.

Change of Vowels.

Every Hebrew or Arabic scholar knows how greatly the vowels change in all Shemitic dialects, but still *according to certain rules*, which science ascertains and scrupulously regards. In dialects which have not suffered from intrusive intermixture of strangers, the vowels interchange with as much regularity as in the Hebrew and Arabic, but in a different manner, and the words differ consequently in sound from those cognate dialects, so that they are unintelligible to the uninitiated, but he who has attended to the rules of those changes, can translate one dialect into the other, (as far as the vowels are concerned), almost without committing a mistake. Thus in the Thüringian provincial dialect, the Italian *a* of the classical German pronounciation, sinks into aw (as in crawl); *o* into *u*; *i* into *e*; and ö and ü become *i*. But if the inhabitants of one province settle in another, and form by intermixture a new dialect, this regularity and consistency is disturbed and broken. Thus we find it in the English language and its dialects;—and thus we find it, if comparing Sanscrit, Persian, Greek, Latin and German words, which doubtless are identic, but where the changes of vowels are subject to no rule, and vary as much as the colours and hues of flowers transplanted into foreign climes and submitted to different treatments.

Change of Consonants.

11.—Those who observe how children, who just begin to speak, form their sounds, will remark that they, in their attempts to pronounce a consonant, are little guided by the ear, but they appear rather to have a distinct idea *by what organs of speech* each particular consonant is to be pronounced, and try to pronounce it accordingly. Hence a (German) child whom I requested to say after me, *kappe* (a cap) said, *happe;*—because he was aware that *k* must be produced by some operation of the throat, but being as yet unacquainted with the *manner of contracting* that organ of speech, produced the simple aspirate *h.* Many similar remarks I have made with respect to other consonants; and the following rules are but exemplifications of one general observation.

Consonants which regularly interchange in different truly cognate Languages and Dialects.

12.—The labials *w*, *v*, *b*, *p*, *f*, *pf*; but not *m*, it being of a nature different from the others of this class.—Examples: It is a fact that all words which in Tamul begin with *u* or *o*, begin in the Karnataka provincial dialects with *wu* and *wo*, (or *vu* and *vo*), and must in many cases, also be written and printed so; just as in the modern English the words, *one* and *once* (anciently pronounced in the same manner as *on* in *only*) are now pronounced as if written, *won*, *wons.*—The Canarese, having once begun a change, carry it regularly through, and pronounce the Tamul *v*, as *b*; e. g. Vadugen (வடுகன), in Canarese: Badugen (from Badugu, north).—*B* in Tamul is *p* in Canarese; e. g. kobam is kopa.

Pf in the dialects of the mountainous parts of Germany, is always pronounced as *p* in the flat countries; e. g. pferd is pronounced perd, pard, part, in Nether Saxony. Thus pfennig in German, is penny in English.

13.—The linguals, *th*, *d*, *t*, *s*, *sh*, and *tz* interchange, but not *n*;—*r* and *l* seldom.

The English *th* is mostly *d* in German;* e. g. *the* is in German *die* (der, die, das);—*this* is *dieser, diese, dieses; than* is *dann;* and vice versâ, *do* is *thue* in German;—*door* is in German both *thür* (door) and *thoor* (a gate).

T in German is invariably changed into *d* in Nether Saxony, and mostly also in English; e. g. *saat* is *seed; blût* is *blood.*

S and *ss* in German is regularly *t* in the Nether Saxon dialect, and in English; e. g. *wasser* is *water; gross* is *great,* and in low Saxon, *groot; was* is *what; das* and *dass* is *that; zu wissen* (to know) is in English, *to wit; er weiss, er wusste* is *he wot; weiss* is, *white.*

Tz changes likewise invariably into *t;*—*hitze* is *heat; sitz, seat; witz* is *wit.*

Sch in German (pronounced *sh*) is mostly, if not always, *sk* in low Saxon, but seldom changed in English; e. g. *fisch* in German, *fish* in English, is *pisk* in low Saxon; thus *schiff* = *ship,* is *skip* in low Saxon.

14.—All the gutturals *y, g, k,* h (or the German and Scotch *ch*), interchange with the simple aspirate *h* frequently, as well as amongst themselves. *G* (according to the Romanizing system always pronounced like *g* in *give*) is pronounced in many German dialects, either like *k* or like h, softer and harsher; and that h is always pronounced, in Nether Saxony, and mostly also in England, like *k,* is well known.

15.—In other languages and dialects other changes of the consonants are observed with equal regularity. *Grimm* in his German grammar gives a specimen, and remarks that, if any word is found in these three German dialects, not changed in conformity with this specimen, it is certain that such a word is an intruder and not originally belonging to that dialect. (See Edinburgh Quarterly Review, No. xcix. Oct. 1833).

Greek and Latin.	*Gothic.*	*Old High German.*	*Modern German.*
πȣς	fotius	vuoz	fuss.
piscis	fisks	visk	fisch (pron, fish).
frater	brôther	pruoder	bruder.
τρεις, tres	threis	dri	drei.
ȣδȣς, οδοντος	tunthus	zand	zahn.
γενος	kuni	chunni	......
χορτος, hortus	gards	karto	garten.

16.—To show what great changes vowels and consonants undergo in a language, I cannot but transcribe two specimens of valuable remains of the old Saxon dialect preserved in the archives of Goslar, and which will prove particularly interesting to the English reader.

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* For brevity's sake I use in this treatise, the word *German* for the classical, commonly received, polite dialect of Germany, which usually is called high German.

Vow of the Saxons against Charlemagne.

1. Saxon .... Hilli kroti Woudana; ilp osk un osken pana
2. Eng. transl. Holy great Wodan; help us and our banner lord
3. Mod.Germ. Heiliger grosser Wodan; hilf uns und unserm banner herrn

Cuitlikin ok kelta of ten aiskena Carlevi ten slaktenera.
Wittikin (ac) ....against the (αισχρος?) Charles the slaughterman.
Wittekind und ....gegen den .... Karl den schläh̤ter.

Ik kif ti in our un tou scapa un tat rofe.
I give thee an ox and two sheep and the robbed (prey).
Ih̤ gebe dir einen Auerochsen und zwei schaafe and das geraubte.

Ik slacte ti all fanka up tien iliken Artisberka.
I slay for thee all captives upon thy holy Hercynian mountain.
Ih̤ schlah̤te dir alle Gefangenen auf deinem heiligen Harz (berge).

Baptismal Vow of a captive Saxon Chief.

Hilken maktik koning Karelo, ick tin fanken Oddo,
Holy mighty king Charles, I thy prisoner Oddo,
Heiliger mäh̤tiger könig Karl, ih̤ dein Gefangener Otto,

pana of thousand, forsaki ten krotten Woudanabelta up
banner lord of thousand, forsake the great Wodan's image upon
banner herr über tausend, entsage dem grossen Wodan's bilde auf

artis barko. So ok all min godmanni ok krisknecti
the Hercynian mountain. So also all my vassals and war-servants
dem Harz (berge). So auh̤ alle meine gutsmänner and kriegskneh̤te

to kerstene. All min sittoma ok recto is in thin uuil
to Christians. All my possession and right is in thy will
zu Christen. All mein besitzthum und reh̤t ist in deinem willen

ok anda. Wi bid di otmode um levens ok fridoms. Uui uuil
and hand. We bid thee humbly for life and liberty. We will
und hand. Wir bitten dih̤ demüthig um leben and freiheit. Wir wollen

oldena bi Gotto almaktik ten vater, ten son, ten iliken ost,
hold by God almighty the father, the son, the holy ghost,
halten an Gott allmäh̤tig den vater, den sohn, den heiligen geist,

so wi nu lernet, ok an di, us nadik konnink.
whom we now learned, also on thee, our gracious king.
so wir nun gelernet, auh̤ an dih̤, unserm gnädigen könig.*

Anomalous changes of Consonants occurring constantly in certain languages.

17.—In consequence of the change of the labials occurring in the Canarese language mentioned in paragraph 12, there would be in that language too great a number of words with *p*, and probably many misunderstandings would be occasioned. That nation has, therefore, been driven to an uncommon expedient, viz. to change the letter *p* into *h*, in all words which they have in common with the Tamulians. Thus the Tamul word, pon (gold), is pronounced, hon in Canarese; and Ponnur or Ponnavur is pronounced in Canarese, Honnavur, (generally pronounced *Honore* by the English); *patti* (பட்டி) a shepherd's hut, in Tamul, is hatti (hutti) in Canarese; hence the places Guzul-hutti, Dim-hutti, and many others.

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* This second piece, by the way, shows the manner how the church of Rome made proselytes, and how people were baptised in those dark ages. In our days no Christian would do so.

Y (the consonant) in Tamul words is in Canarese constantly pronounced and written *s*; hence பெயர் or பேர் (peyer or pêr) is in Canarese changed into *heseru*. Also in some Tamul provincial dialects this change takes place, and some words of this class have come into the Tamul dictionaries; e. g. yamam (யாமம்) is also written *samam*. Attention paid to such peculiarities makes the acquirement of a language more easy and amusing.

18.—*S* and *r* exchange.—*Iron* is *eisen* in German;—*hare* is *haase*;—I *was*, thou *wast*, is in German, ich *war*, du *warest*; — *δυς* is *dur* in Sancrit, hence turasei, turitchei (evil desire) and turyosenei (evil thought, evil advice) in Tamul; *auris* is in ancient Latin, *ausis*, hence, auscultare; nasus=nares?

19.—The letter *h* becomes not only h̤ and *k* (as mentioned before), but also *s*; frequently it is dropped, sometimes it is softened down into the semivowel *w* and occasionally into *y*.

Mankind in their first stage of cultivation expressed their feelings and thoughts with unshackled freedom, warmth and energy; hence the simple aspirate *h* abounded in their dialects;—thus we find it still in a great measure in the remnant of those languages which were *most anciently fixed* by writing, as the Hebrew (with the Arabic), and the Sanscrit.

But when, by the increase of ideas, more words were required, and perhaps also merely in consequence of the greater exercise of the organs of speech, these aspirates were variously modified, in order to produce more words differing from each other in form and sound; and also when those tribes, by more frequent intercourse in different circumstances, found it necessary to give more substance, more body and bones, to their language; it may be supposed that the simple aspirate was in many cases changed into χ or h̤, k, ع and غ. More particularly those tribes who removed to, and remained long in, wild mountainous countries, where the continual noise of the winds shaking the trees, made it necessary to produce still harsher sounds, as j, sh, ch; whilst those who removed to delightful plains, and became comparatively mild in their manners and finally subdued by conquerors, changed the *h* into the milder *s*, (and subsequently into *t*) or into *w*, or lost it entirely. Hence in some European languages *h* occurs seldom, and the Tamulians have none at all, since they were, from the most ancient times, by various succeeding mountaineer-tribes, pushed to the southern plains of India and subjugated.

It is strange that the Greeks retained the *h* in most words, where even the northern mountaineer-tribes have an *s*; e. g. ἑξ, sex in Latin and German; ἑπτα, septem, seven;—ἁλς,=salz (German)=salt (Eng.)=Sal=Saul (Bohemian);—ἁμα=ham (Armenian)=cum; but in this case the Greeks have likewise changed *h* into *s*, as συμ=συν,(as well as into *z*, e. g. ξυν), *simul, sammt* (together) in German.

Another remarkable exception is that the Teutonic nations retained the *k*, where even the Hebrews and other nations living in milder climates and countries, have *a k*; e. g. horn=cornu=kärän (in Hebrew);—halm=calamus; house=casa; heart=Herz (German)=καρδια=cor; hollow=hohl (German)=κοιλος, (hence, *coelum*).

Mountaineers change frequently the *s*, into *sh*; hence this sound abounds in Sanscrit (which language was certainly formed in the Himalaya-range*). Hence the Swiss and the Swabians (the inhabitants of the mountainous country of the black forest) say, du *hasht*, instead of du *hast*; *isht*, instead of *ist (=est)*; and the Tamul, being a language of a flat and even country, has even a grammatical rule, according to which such Sanscrit words must be softened down; e. g. instead of the Sanscrit word *nashtam*, they write grammatically, *nattam*; instead of *rakshiden*, they write and say *rakiden*; instead of *sodisham, sodidam*; *&c.*

But since most tribes of the human race—before they finally settled where we now find them, and resided for centuries in very diversified climes and soils, until they were expelled, or emigrated of their own accord, since they intermixed with various other tribes (at least in many cases)—experienced numberless changes in their circumstances, we find now in their languages very many exceptions from the general rules here laid down. But I doubt not that, if those who are engaged in studying any language, kept these ideas constantly in view, comparing the words of such a language, with those of other languages and dialects with which they may be acquainted, and committing their observations and remarks to paper, they would be able eventually to draw up such instructive lists as in paragraph 15;—they would not only be able sometimes to throw light on history, but would also make the drudgery of learning languages more easy and interesting to themselves. Much is still to be done and to be discovered by means of comparative study of languages. Somewhere in the Asiatic Researches, for instance, is a remark that a certain number of identic words, not apparently derived from the Sanscrit, seems to exist in all the languages and dialects of India.* If by the united endeavours of scholars in the north and south of India, a list of such words was produced, it would afford useful hints to the philologer, historian and antiquarian:—and attention bestowed on the rules according to which consonants change, would greatly assist therein.

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* Cellarius says: Brachmanes tandem commemorandi in hac India sunt. Non autem philosophorum modo generis et sectae id nomen fuit, sed *et gentis diffusissimae, cujus maxima pars in montibus degit*, reliqui circa Gangem.—The Brahmins, according to their own tradition, *originally came down to the plains of India, by way of Hurdwar.*

20. — I now proceed to substantiate the preceding remarks, and select for this purpose the word ὕλη, which means, 1st, a forest or wood, silva, and 2d, branches, sarmenta (as in Anabasis, 3, 5 and 6) from which root, in each of these meanings, various derivations exist. Even the word *silva*, (more correctly sylva) comes from ὗλη, and the identity becomes more evident, if we remember that the Romans pronounced it also sylua (the u as a vowel, as in Horace, Ep. 13, 2).

ὕλη
Sylva = saltus = wald (German) = wood;—wild (English and German), sylvestris.
συλη (a lost middle-link), hence ξυλον.
Holt (Spencer) = holz (German) *wood*, in the meaning of lignum and saltus.
κᾶλον, (lignum);—κῆλον (jaculum, the shaft being of wood).

21. It is mentioned above, that the words *horn*, *cornu* and *karan* are identic, but before I proceed to give a list of the derivations, I must remark that it is evident both from Revelation and from the nature and history of the languages now in our reach, that mankind formed them by the exercise of their mental faculties. A limited number of very simple (perhaps mostly monosyllabic) words was the common property of the primitive races. The Caucasian tribes, after their separation from the others, continued to multiply their words, partly by merely modifying the sound of a vowel or a consonant of a word already in use†

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* I suppose kotei (a fort) is such a word; also *ûr*, *vûr* and *buri*, with their variations, buram, veram, bôre, pôre and pûr, meaning a village or smaller town.—After having written this, I find in the Madras Journal of Literature and Science, No. 13 page 398, the following statement: "There are in it" (in the Pali or Magadhi dialect), "words common to Telugu and Tamil, but not Sanscrit; lending some force to an opinion that a common dialect, not Sanscrit, once ran through the whole of the continent of India."

† An instance of the change of the *vowel* is κᾶλον and κῆλον; instances of the change of the consonant are frequent; e. g. the word *waffen* is pronounced in Nether Saxony *wappen*, (hence the English word *weapon*), and means, 1st, arms of offence and defence; 2d, the figure painted on the shields of the old Germans. But subsequently the word *wappen* was likewise received into the high or classical German, and means now exclu-

or partly by adding a letter or syllable (not to mention the prefixes), and partly by inventing new words, many of which were certainly onamatopoietic. Words which were formed by modifying the primitive root, always expressed ideas related to the meaning of that root; e. g. the original meaning of the primitive root of the Hebrew word karan קָרָן or in Greek, *καρηνον*, seems to have been, *skull*; but this root (kar or har) variously augmented, was applied to all which is about the skull, e.g. the hair, the horn (of animals) &c. and then, secondarily, such a modified and augmented word was used to express cognate ideas ; as, hardness, strength, confidence, superiority, &c. If it is remembered that the dual and plural forms of kärän (in Chaldaic also karnah) are, karnayim, kranayim and kranoth, the correctness of the following etymologies will appear still more evident.

The primitive root, then, is *har*, and one of the first modifications is *καρη*; further modifications of har are härän, kärän and kran, and a modification of *καρη* is *κρας*. From these modifications the following families of words have sprung :

Har {
Hair (English) = haar (German).
(*Härän*) horn (G. and Engl.) = cornu ; hirn (G.)=brain.
corn = korn (G.) = grain ;
cerebrum ;—
καρη.... } *καρειαρ* and *κραιρα*; *κερας*, *κερατος* and
κρας } *κεραος*.
Kärän.... *καρηνον* ;— *κορωνη*= (summitas et) corona.
Kran. .. { *κρανον*, *κρανος* } (galea); *κρανιον* = cranium.
κρανειον } *κρανεια* = cornus,
(having *hard* stones),
crinis, (only used of the hair of the *head*)
κρηνη, a spring, or *head* of a brook.

From *κερας*, *κερατος*, the horn, the symbol of strength, are certainly derived those words in the Greek and other languages, which denote strength, superiority and government; as, *κρατος*, *κρατεω*, as well as the word, *hard*, (Eng.) = *hart* (German).—The word *κοιρανος*, comes most probably from *karan*; and *κυριος* from the simpler root, *kar*; just as *herus* in Latin, and *herr*, the lord, (in German), come from the still more primitive form of *här* ; and I should have placed these two words in one line with *hair* and *haar*, had I not feared that this association would have appeared, at first sight, too extraordinary

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sively, the *coat of arms* ; whilst the word *waffen* means solely *arms*. *Knabe* means any boy, and was, like the softer English word (*knave*), originally used for the companions of knights, but subsequently the intensive pronunciation of this word (viz. knappe) was used to express this second meaning ; as : *schild-knappe*, i. e. armour bearer ; müller's knappe, i. e. servant of a miller, (pronouncing the *k*).

and nearly ludicrous. Reviewing all these various, but certainly correct, derivations, I cannot doubt that also κραλης (a king), and král in Bohemian, with exactly the same signification, and the German word, *kerl* (a young strong man), Latinized Carolus, and Charles, come from the same root.

I hope I shall be pardoned, if I add here a question, the decision of which I leave to Hebrew scholars:—Did Job (16, 15) really intend to say, I have defiled *my horn* with dust, (as Luther and the English translators have it)?—I think it appears very evident from the above etymological genealogy of the word *kärän*, even if there were no other proofs that it had in the original Hebrew two or three different meanings, viz: 1, the head; 2, the horn which grows upon it in certain animals, and 3, strength or glory (See also Ps. 89, 17—92, 11). And it is a fact that in the Hebrew as well as in the Arabic languages, there are many words which have two distinct (sometimes opposite) significations, where the connexion alone must decide; e. g. ḫattaath (חטאת) Deut. 9, 21. Lev. 6, 25, 30, and Zach. 14, 19. Every translator should surely strive to divest himself most carefully of the prejudices and mistakes of his predecessors, and to do justice to his author, so that the real meaning and context, as well as clearness, good taste and the modern idioms, be regarded. Job certainly meant to say, "I have covered *my head* with dust." The vulgate has, Operui cinere carnem meam;* but the Septuaginta have understood the figurative expression better, and have the word σθενος; and De Sacy, J'ai convert *ma tête* de cendre.

22.—Some other etymologies, both regular and anomalous, illustrative of paragraph 20, are the following:

El (êl, אֵל) a strong one; God; from this the Greeks have formed, consistently with the above mentioned rules, ἡλιος, and the Latins the word, sol;—and σεληνη seems to come from the same root;—ἑρκος, = kerker (Germ.) = carcer;—ἁλλομαι = salio = sally;—ἑσπερος = west? = vesper;—adim (Armenian) = I hate = odi (odium)=ich hasse (Germ.) = κοτεω; in this series of words, the aspirate is quite anomalously employed; *Hind*, *Sind* and *Indus*, where the Greeks have rejected the *h*;—ὑπνος = sofnadi and sveffn (Icelandic), = shvopno (Sanscr.). In Latin the π has been changed into the nasal letter *m*, on account of the following *n*, equally nasal, and thus the word *somnus* was formed; but on the other hand also they dropped the *n*, and thus, *sopio* and *sopor*, arose.—The Quarterly Reviewer, in the number above alluded to, derives the word *equus* from ἵππος, but this is not a scientific derivation, I would much rather compare the word *equus* (in

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* Most probably the *original* Latin translation was: *cornu meum*, which a very early copyist changed into *carnem meam!*

Gælic) och (oẖ) with the word ὤκυς, and derive from ἵπ (πος) the syllable *cab*, which is the root of the word, *caballus*.*

23. The intimate connexion of the Japhethitic and of the Shemitic languages, as demonstrated in some of the preceding etymological deductions, is surprising, and deserves the attention and further inquiry of scholars. To prove that they are not quite solitary instances, I shall add here some more.

kol (קוֹל Hebrew καλεω to call	قال (dixit), Arabic ;=calo (ancient Latin, e. g. comitia calata,—nomenculator or nomenclator)=clamo ; κλαγγω, κλαζω= klang (the sound), Germ. ; klingen (to sound);—kalladi (he called,) Icelandic; kallen, to speak, (in the provincial dialect of Aix-la-Chapelle)—hallen, (to sound, resound,) Germ. ; gällen (to sound unpleasantly) Germ.
kara (Hebrew)	crier (French)=shreien (Germ.); kreishen (to cry or weep); cry ; κραζω = kricheti, pron. kričeti, (Bohemian).
ερα, εραζε Hesiod. εργα, 419	ar * a (Chald.) אֲרַע and אַרְעָה äretz ar * a (Hebr.) = Hertha, Dea Terra (Tacitus Germ. 40) = earth = erde, Germ. ;—wurzel = ριζα=radix. αρις = (herba, Hesychius);—εριθος ;—aro ; arvum ; ervum=οροβος.=erbse (Germ.)

Gib * ah (Hebr. collis) ; قبل (Arab) = cupola=kuppel (G.) ; gabal, (Hebr. to finish) :

κυφη — kuppe (summit, Germ.) ; caput ; = kappe (Germ.) = cap ; κεφαλη ; capillus ;—giebel, (summit of a house) Germ. ; gipfel, (summit of trees) Germ.

kopf (head, Germ.) = haubet (ancient G.) = haupt, (modern German) = head.

The derivations from kol and kara might be owing to onomatopoeia ; but not so those from ερα and κυφη. Some others of the latter kind are, shen (Hebr.) = zahn = dens = οδυς = tooth.—Manah (Hebr. to count, arrange, apportion) ; hence, μνα, μνη = mina ; money, moneta ; mint (Engl.), minda (tribute, Chald.) ; from the same verb come *μηνη* = *μανα* (Doric) = moon = mahn (Nether Saxon), = mond (German) ;—mensis = month = monat (German) and *μην, μεὶς, μεινος*.

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* I cannot but transcribe from Professor A. W. von Schlegel's "Indischer Bibliothek" the following pretty French lines :

Alfana vient d' equus sans doute,
Mais il faut avouer aussi,
Qu' en venant de là jusqu 'ici,
Il a bien changé sur la route.—Ind. Bibl. Vol. II. No. I.

But notwithstanding the great change, I think it is evident, that the relationship of ἱππος and *caballus* is quite legitimate.

To sow,
säen (Germ.)
sära (Hebr.)
sevi ;—semen = syme (Bohemian), = saame (Germ.)
satum ; saat (Ger.)=seed=zaat (Dutch)=sadeh?(Pers.)
sero—sermn (= seed, Armenian).
σπειρω ;—διασπειρω = dispergo ; spargo ;—σπερμα.

24.—Thus we find the simplest roots in the Greek, Teutonic or Latin languages, and their derivatives in the Shemitic dialects, or in Sanscrit, whilst these two latter tribes have lost the root ; so that we must conclude, first, that the Shemitic and Japhethitic tribes stood pretty long in close connexion, and secondly, that after the various tribes had dispersed over the earth, they continued to form new words by adding, and also by prefixing, to their common roots, letters and syllables, and this often so analogously that we find sometimes the very same form in Sanscrit and in Icelandic, whilst the intermediate tribes modified and augmented that same root in some other way. The Greek language has preserved to us the greatest number of the most simple and natural (apparently) primitive roots ; and Sanscrit scholars will be able to say, whether many similar, most simple and primitive roots (not imaginary ones), are actually found in ancient compositions as self-existent parts of that language. The following genealogies of words may suffice to explain my meaning :

γαω, γεω
Γη, the wife of
Ουρανος and
mother of all.
γαμεω ;—γαμβρος = gener ; bräuti*gam*, (bridegroom,) German.
yanami (Sanscrit) *γινομαι* ; *γενος* = genus = kind (Engl.) ;—*γενειον* = kinn (G.) = chin, ubi barba nascitur quæ protestatem gignendi indicat ;—*κοννος*.

gigno ;—genitus = (contracted into *kind*) a child (in Germ.) *νηγατεος* Il. Ξ 185.—*γνησιος*, gnatus, cet.

αω, flo,
spiro
Flo, *i. e.*
I blow and breathe
αηρ ; *ανεμος* ; animus ; anima,
atma &
anima,
Tamul
ὑπεραης Iliad Λ 297—*ηνεμοεις* Iliad M 130.
ζαης Il. M 157. ; *αητα* Il. Ξ 254.
clamo ; *αυω* Il. Λ 461.2. ; *αΰτη* Λ. 466., *αυτεω* M 161.
sicco viz. by blowing. *αυος*, M 137.

ὕω pluo
ὑετος, M 133 ;
ὑδωρ ;—ὑδρως = sudor = swet=schweiss, (Germ.) wodu (Bohemian) = water = wasser (Germ.)
hyems = *χειμων, χειμα*
humor, humidus ;—uvidus, udus ;—*ὑγρος* cet.

Of the Dialect of the Todavers, the Aborigines of the Neelgherries.

2. There can be no doubt that an examination of this dialect, according to the principles laid down in this essay (or, according to improved ones) and a comparison of it with other languages and provincial dialects of India, will be the means, together with other collateral evidences, of discovering and demonstrating, if not with nearly mathematical precision, yet very satisfactorily, to what tribe the Todavers originally belonged, and about what time they may have separated and become an isolated race of mountaineers. And it may be expected that *one* beam of clear light being once thrown upon their history, it may afford a clue which will lead to historical discoveries relative to other tribes also.*

One third perhaps of the words of the Todaver dialect I cannot yet trace to any language with which I am acquainted; the other part is *Tamul,* but so disfigured, by a regular process of changing the letters, that such words are not easily recognized. They change the vowels nearly in the same manner as the Thüringian peasants do. Every vowel sinks in its pronunciation one or more degrees deeper than in Tamul, and the consonants are coarser.

They change *v* into *b, or p*;—*b* into *p*;—h or g is frequently changed into *k; e.g. pôgiren* போகிறேன is in their dialect, *pôkenn; s* is generally changed into *k;* e. g. sevi செவி is pronounced by them, kevvi,—*sînna* சின்ன ;—and vice versâ, kilei கிளி is changed by them into tzillu;—but the most peculiar change is that of *r, l,* ṟ, ர ல ள and ழ into a kind of '*sh* ஷ or ழ; yet so, that the consonants, the place of which this sound of *sh* respectively supplies, are in many cases distinguished by the ear; very much so as a distant object can be pretty distinctly recognised in the drizzling clouds so frequent on the Neelgherries. Their words which they have in common with the Tamulians, are mostly changed into monosyllables; e.g. müṟugu மிருகு is changed into *meṟshk*;—ilei இலை into eṟsh; viragu விரகு is verg, berk and burk (for it is a known fact that all unwritten languages are very vague and unsettled in idiom and pronunciation); völli வெள்ளி is *bülṟsh* the *l* and ṟ, however, are so melted together, if I may say so, that they form one consonant, although both sounds be pretty distinctly heard;—*pal* பல is paṟsh; *puli* புலி is puṟi; pâl பால is polsh; *vill* or *villu* வில் or வில்லு

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* Although their language may appear to be a jargon, and they themselves may be degraded, yet they are *men*; homo sum, humani nihil a me alienum puto.—I scarcely need remind the reader, of Qamoos who was long seeking in vain for the correct meaning of two words, when writing his great dictionary, and learnt them at last from the mouth of some poor children in a little village.—Even in merely philological respects, the Todaver dialect is interesting.

is pronounced by them *bullu* or *pullu*, perhaps adopting in this case the pronunciation of the Badugers), their own original pronunciation is bursh and pursh[*] as if written in Tamul, புழ்ஷ் ;—*nilam* நிலம is *neúlne*,[†]—*vanam* வானம் is *pône* ; vittu or videi விதது or விதை is *pott* ; varugirên வருகிறேன is *vashkenn*, or *vaṛkenn* ; *tarugirên* தருகிறேன is *tashkenn* ; *irukkirên* இருககிறேன is üshkenn.

Instances of rejection of consonants are the following : Irul இருள is changed into ölu ; *vaüru* வயறு into *bîr* ; *veiyil*, வெய்யில into bîr or bîrsh (thus they call the sun) ; maṛei மழை into mâ ;—maram மரம into meunu ; and paṛam, palam பழம into pôm—(this is the only instance which I have met with, where the Pali or Tamul termination of *m* is preserved) ; சமுததிரம is sotara. This word they have certainly received through their intercourse with the low country ; and it shows how they assimilate many foreign words to their idiom. Another clear instance is kâḫotz ; so they pronounce the Tamul word காகிதம or காயிதம(kagidam). More easy foreign words they leave unchanged ; e. g. the Hindustani word, *tuvi* (a kife) and the Canarese word, *bara*, to write, which is evidently also the root of the Tamul *vari*, வரி ; it is consequently not even certain that they have borrowed the word, *bara*, from the Canarese. It is remarkable, that they have adopted scarcely any Canarese word, as far as I can ascertain, although they have so much intercourse with the burghers or budagers.

Their grammar contains the rudiments of the Tamul, with several forms of their own ; e. g. nan pürandiruckiren நான பிறநதிருககிறேன is in their dialect ôn pêrdsh bimi—and in plural, om perder bumi, where the auxiliary, *I am, we are*, is expressed by *bimi* and *bumi*. Whether this is the case in any other Indian dialect, I do not know. They say also, *bini* instead of *bimi*. Their pronouns are, ân or on, I ; ni, thou ; athm and ath, he ; ôm, we ; nümmu, you ; athamm, they, atha, (neuter) ; the forms of the dative are for enacku enk' ; for unacku, nink' ; for avenucku, ânk.

Some phrases are : on üshkena bokena ? Shall I stay or go ? Ishenirkusu barkena ? Must I (do I) write like this ? Ninnûr perdwudi ettodu ? unnôdu purandavergel ettenei ? Ninku kinnudu ettodu ? unacku sinnavergel ettenei ? Tölim enku kinnodu. Ellârum enacku sinnavergel. These specimens will suffice to show the great similarity of this dialect with the Tamul, although by no means its identity.

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[*] Dr. Zenker says in his work entitled "Plantæ Indicæ" as follows : Ut Specimen nomenclaturae vagae aboriginum exhibeamus, hanc arborem (Rhododendron nilagiricum) ab ipsis *Pullukumaru* nominari, adjici liceat. Cl. Ritter vero in opere suo geographico insigni (Erdkunde cet.) nomen *pursh* ab indigenis accepisse monet." Mara means, *tree*, in the Canarese. No alphabet could express the word *Pursh* correctly, as well as many other Todaver words, except the Roman with diacritical marks according to Sir William Jones' principles.

[†] Eu, according to the French pronunciation, as in peur ; the pronunciation of ŏ is somewhat different.

Some words, the origin of which I have not ascertained, are the following: *teckl*, or *teckl moḫ*, a man (moḫ is the same with maḫen); tuj moḫ, a woman; kuḫ, a girl, a daughter; ên, father, (ennên, my father); avv, mother; tûru (if written in Tamul: தூறு,) a plant; poḫ, red; tûvi, a feather; tashk, above; erk, below; wüldi, pleasant, good; ufn, the back; nobkôde, shoulder; mît, chin; mithu, whisker; moi, beard;—pevvêl, thumb, (vêl and veld, is the Tamul விரல) ; polvel, 3d finger; uṛndôṛi, (if written in Tamul: உளழ்ந்தோழி) 4th finger; erk koi, left hand (lower hand); paṛsh koi, right hand, (வலதுகை). Also the names of the week days may perhaps afford a clue, to discover this tribe's relationship with others; they are: Otsôm, or Ossôm, Sunday; Tuvôm, Monday; Om, Tuesday; Pudiom or Puduvom, Wednesday; Ta-âm, Thursday; Pülsh, Friday (வெளளி); Thunni or Etnat, Saturday (சனி); Etnoṛ, a week (எட்டுநாள). The identity of Puduvom and புதனகிழமை, (Buddhu's day), is remarkable, and seems to be a proof that they are a branch of the ancient Buddhists. This idea seems to receive support by the fact, that they call the week etnoṛ (*i. e.* eight days), just as the Teutonic nations, which coincidence intimates very probably an identity of ancient tradition or opinion. Puduvôm, Pülsh and Thuni are the only days the etymology of which agrees with the Tamul. They call also the star, *Venus*, Pülsh or Püṛsh. Om, (Tuesday) being apparently the first day of their week, may likewise afford a clue to trace their origin, if any tribe in India, or elsewhere, should be ascertained to consider this day as the first of the week. This word is strikingly similar to the Hebrew word: yôm, a day. But this is the only word in their language which I have as yet observed to be similar to any of the Shemitic dialects. Their temples, (at least that of the five Cairn-hills near Peycâri), are called: Gudimana. Is this as much as Gudi's or Gaudama's (Buddhu's) court-yard, corrupted from, Gudamamanei ?—since manei (மவின) means court-yard in Tamul and Canarese. The termination of the verb in *i* as in bini, bimi, before mentioned, as also the negative form of the verb, as: kâneni (காணேன), kâtteni (காட்டேன), âreni or âriani, (அறியேன) reminds one of the Sanscrit forms of dodami, dodasi, &c. Their numerals also, and the manner in which they have altered and abbreviated the Tamul ones, may afford a clue, if any other Indian dialect exists in which they are similarly pronounced. They are: 1, odd; 2, ätu, (or ait); 3, muthu, mud; 4, nalk (Canarese) and nank (ancient Tamul); 5, üj; 6, ôr, ôd; 7, öṛ, ud; 8, ötthu; 9, unbôth; 10, potthu;

11, ponnod; 12, ponnät; 13, ponmudshu; 14, pânk; 15, poyj; 16, par; 17, pöṛ; 18, pottsh (in Tamul characters, போட்ட்ஷ); 19, pônbôth; 20, övvôth; 21, övvoduddhu; 30, muppoth; 40, narboth; 50, etboth; 60, arroth; 70, öṛvoth; 80, öttvoth; 90, önboth; 100, onnûru; 101, onnur odd, &c.*

The little I could as yet ascertain of their traditions is the following—How the earth came into existence, they confess themselves ignorant of. The first God, named öônu, came out of the earth like mist. His wife is called, *Pinnar'wuṛsh.* His son, *Têkershi,* is the governing god, before whom marriages and all other solemnities are performed; he is the same, they say, who is called, karta, by the burghers, and in the Konkani language. (The similarity of the words öon and *αιων* I think to be accidental, as I have found no other similarity between the dialects, or nations, of the Todavers and of the Greeks). One of the five kinds of Neelgherry-bees is called *pêtên* (*ten* means in their dialect both the honey and the bee); it once stung God, and therefore he decreed, that that kind of bees should never have much honey. Others relate that "god asked once the bee to show him, how it made honey; the bee refused compliance; and god tied it with a thread, and kept it prisoner for six days; the bee was obstinate, and god let it go again." When I could not suppress a smile at the narration, the Todaven who related it to me, added: "this is certain; I shall bring you a bee; you will see how narrow it is in the middle; that comes from the thread." I have not yet been able to understand sufficiently, what they relate about their own history; thus much I ascertained—They believe the first couple who resided on these hills was a man of the Iruler tribe and a Todaver woman; then came another couple, a Todaven and a Iruler woman, from the mountain *Cuppara* (which, they say, can be seen from Coimbatoor towards the western sea); but returned again to *Cuppara:* and when the first couple sent them an invitation to return, they refused to come."—The Royal Asiatic Society of Great Britain and Ireland, in a series of questions circulated many years ago, state that a kingdom of Jews in the south of Arabia was destroyed by Mahomed, and that many fled to the Malabar coast; and the question is added—whether any trace of the remnants of that people could be found in the adjacent countries? The striking similarity of the features of the countenance of the Todavers with those of the Arabians or Jews, as well as their own tradition of their having come from the western region, deserve attention, but nothing can be decided without a much more intimate acquaintance with their dialect, manners and traditions, than we at present possess.

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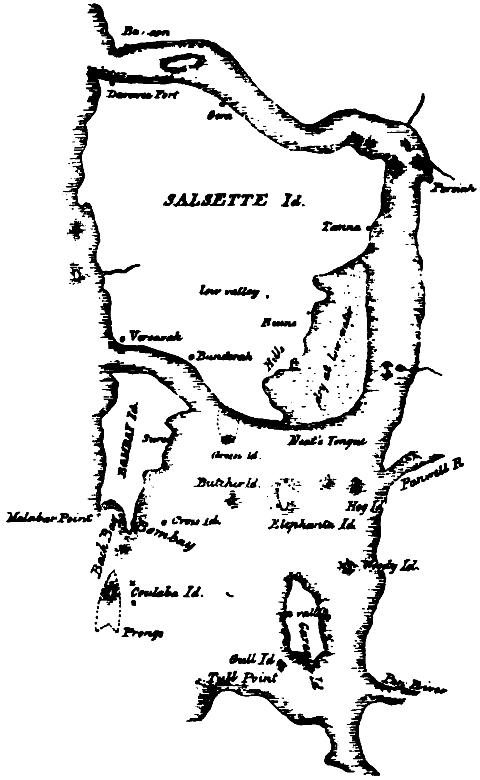
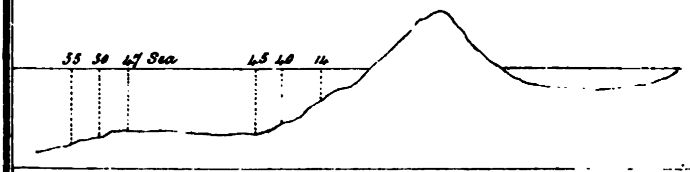
* I am preparing a Vocabulary of the Todaver dialect with the explanations both in Tamul and in English, to serve as a primer and elementary book for schools to be established amongst them, and which I intend putting to the Press.—Since the Tamul alphabet is not suited to express many Todaver words intelligibly, it is necessary to adopt for this purpose the Roman alphabet with diacritical marks, whereby this work will, at the same time, become more generally accessible to the literary public.


Bassein
Daravee Fort
Gora
SALSETTE Id.
Persiah
Tanna
Low valley
Ruins
Hills
Veresvah
Bundorah
BOMBAY Id.
Sion
Green Id.
Neat's Tongue
Butcher Id.
Panwell R.
Hog Id.
Malabar Point
Back Bay
Bombay
Cross Id.
Elephanta Id.
Woody Id.
Coulaba Id.
Prongs
Gull Id.
Tull Point
Pen River


55
50
47
Sea
45
40
14

XIII.—EXTRACTS.

1.—*Sketch of the Geology of the Bombay Islands.*—By ROBERT D. THOMSON, M. D.

Although Bombay has been known to Europeans since the year 1509, when the Portuguese Viceroy Ameyda captured a vessel in what the historian of the time has termed " the River of Bombaim,"* no connected view of the geological nature of the islands and antiquities in its neighbourhood has hitherto appeared. It is with a view of contributing to supply this omission, that the facts contained in this paper, which were acquired by observation, in the course of a short residence in that presidency in 1832, were drawn up.

The mean of fifty-nine observations in May, June, and July, 1832, gave me 83° 14′ for the temperature of the harbour of Bombay. This includes twenty-seven observations made after the setting in of the monsoon, on the 14th June. But a period of thirty-two days, immediately previous to this date, affords 83° 43′ for the mean temperature of the hot season; and twenty-seven observations gave for the commencement of the rainy season a mean temperature of 82° 85.′ The average temperature for 1803 was 81¼°, and for 1804, 80½°; and the number of rainy days for these years 102.†

The quantity of rain which fell in June, July, August, and September 1817, was 104 inches.‡ On the 23d June 1817, no less than 9·3 inches of rain fell in one day. In fact, the inhabitants of temperate countries can form no idea of the quantity and force of the rain which falls between the tropics. The mean barometrical height for half of 1816 and 1817, was 29·986 inches.

The harbour of Bombay, situated on the Concan, or Pirate Coast of the western peninsula of Hindostan, is possessed, as its name implies, of peculiar excellence and capaciousness,§ and has, therefore, been considered of great value ever since it became part of the British possessions. It may be described as forming the southern portion of a rectangular bay or recess, which lies between Tull Point in N. lat. 18° 47′ and Basseen, in N. lat. 19° 19′, and between the parallels of E. long. 72° 47′ and 73° 3′, possessing, therefore, an extreme length of thirty-two miles, and an average breadth of sixteen miles. The island of Salsette occupies seventeen miles in the length of the northern part of the bay, acquiring a breadth of from fifteen to seventeen miles, while its circumference has been computed at seventy miles.

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* Sousa's " Portuguese Asia," Tome, i. p. 146.

† Ann. of Philosophy, xiii. 145.

‡ Ann. of Philosophy, xii. 212.

§ From the Portuguese *Buon-Bahia*, good bay. The accompanying chart of the harbour and islands of Bombay, I have enlarged from that of Laurie and Whittle.

A considerable proportion of the remaining part of this bay is occupied by Bombay, Caranja, Elephanta, Butcher, Woody, and Cross Islands, which, being disposed in a crescentic manner, form the harbour of Bombay, an open and extensive bason eight miles in diameter, affording good anchoring ground and secure shelter for fleets of ships of the largest burthen. It is these insulated portions of land, that I have designated the Bombay Islands. The appearance presented by these islands is highly picturesque, as they are in many places adorned with thriving woods, which, between the tropics, always produce rich and refreshing scenery. But, in the Island of Bombay, the present trees appear of recent origin ; for, we learn from older writers that the land was formerly swampy, and afforded no plants or trees worthy of mention. At present the higher parts of Salsette and Caranja are nearly destitute of trees, but they are for the most part thickly clothed with straggling jungle.

The general contour of these islands corresponds closely with that of the adjacent continent, and far as the latter has been investigated, the formation appears identical. The altitude attained by the rocky masses in these insulated lands is never great, although they are all considerably elevated above the level of the ocean. The dark hills of Salsette reach the greatest height, next to them in order come the rugged masses of Caranja and Elephanta, but Bombay and the remaining islands approach more nearly the character of plains.

Before taking a separate view of each of the more considerable of these islands, it seems satisfactory to present at one view a description of the rocky masses and minerals, which form their essential constituents, and here it may be premised, that the rocks belong all to that class which has been termed trappean, or, theoretically, volcanic, as distinguished from the granitic series, or plutonic rocks.

1. Basalt, occurring in *situ* at the ruins of a chapel in Salsette ; colour, dark-gray, or blackish, with numerous crystals of olivine and augite interspersed ; fracture, irregular, dull. The upper portion of the ridges in Salsette appears to consist of this rock, or modifications of it.

2. Black basalt, in Elephanta, often presenting a homogeneous aspect when fractured, but frequently containing minute portions of olivine, sometimes in rounded granules, at other times crystallized ; texture highly indurated. This and the former variety, fuse before the blow pipe *per se* into a mass, resembling pitchstone. The celebrated figure of the elephant, close to the village of Gallipooti, consists of this rock but it appears to be of limited extent.

3. Amygdaloid, appearing at the great temple of Elephanta, possesses a hard wacké basis, containing cavities filled with rock crystal and zeolites, &c., some of which are often met with enclosed in the strong mass in the form of rounded nodules, whose crystalline structure is not

apparent until they are transversely fractured. The rock has a purplish aspect, and is evidently decaying in many situations, by the readiness with which the atmospherical influences act by the medium of the amygdaloidal cavities. Before the blowpipe *per se* this rock simulates fused basalt.

4. Yellowish gray claystone porphyry, at the lower cave of Elephanta. The predominating particles have a yellow resinous appearance, with a black basis.

5. Green claystone porphyry, appearing at Baboola Tank; fine-grained, and admitting of a good polish, interspersed with dark-coloured soft particles, which have an even fracture, and appear to be small masses of indurated clay.

6. Amygdaloid, with a light coloured porphyritic basis and green cavities, accompanied generally with large crystals of calcarious spar, from the neighbourhood of Parell. The calcarious spar is sometimes dark-coloured, probably from the effect of reflected light upon it in its impacted situation.

7. Numerous large fragments of shell conglomerates may be observed on the shore of Elephanta, consisting of a nucleus of porphyry, or amygdaloid, closely surrounded by adhering bivalves, which afford means of extending the limits of the growth of the mangrove.

The amygdaloidal cavities contain numerous species of various classes of minerals, but those which are of very common occurrence are included under these genera.

CLASS I.—ACIDS. GENUS, SILICA.

1. Rock crystal—termed *Palunca* in the Malabar language, *Spadika* in the Grantham dialect—occurs very abundantly in each of the islands, in the form of crystals, varying from the most minute size to half an inch in length.
2. Common quartz.
3. Milk and Rose quartz.
4. Chalcedony.
5. Amethyst.
6. Agate.
7. Carnelian, rare in the immediate neighbourhood of Bombay.
8. Oriental jasper, or blood-stone, also rare, but abundant in Guzurat and Cambay.

CLASS II.—ALKALIES.

I. GENUS LIME.

Calcarious spar.

II. GENUS ALUMINA.

1. Mesolite, whose composition is expressed by the formula $3\ Al.\ S + (\frac{1}{3} C + \frac{2}{3} N)\ S^3 + 3\frac{1}{3}\ Aq.$[*]

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[*] The result of an analysis by me. *Jameson's Journal*, 1834.

2. Heulandite, observed frequently in Caranja and Elephanta, appearing in the form of large white crystals.

Of this last genus the number of species in India will be found extremely numerous; indeed there can be little doubt that this country will afford an immense field of discovery for future mineralogical investigators, nor is the scantiness of our mineralogical knowledge of India so much to be wondered at, when we reflect that, as yet, scarce a single addition has been made to our lists from the British possessions in the East, where, of all portions of the globe, geological facts point out the certainty of the greatest mineralogical stores.

The agate occurs in the form of round nodules, as well as in flat waterworn cakes. The chalcedony forms a basis generally upon which the rock-crystal and amethyst are seated, and in one beautiful specimen procured in Caranja, fine crystals of heulandite are similarly placed. The mesolite occurs in large radiated crystals, and likewise in the state of a lump-sugar appearance, which, when fractured, exhibits minute, slender, silky-like crystals, disposed in a radiated form.

Carnelian may be procured in the bazars, brought from Cambay, where it seems to exist in considerable abundance. It appears that the specimens of this mineral which are worked into ornaments, are principally obtained from the neighbourhood of Broach, by sinking wells in the dry seasons in the channels of torrents, at the bottom of which they are found lying in the form of round nodules, intermixed with other rolled pebbles, probably forced by the impetuosity of the mountain streams from greater elevations, and generally weigh from a few ounces to two or three pounds.

Some of them are red, others pink, but the most delicate and beautiful is certainly the colourless or opaline variety. There can be little hesitation in affirming that similar sources of this mineral exist in the beds of the numerous streams which abound between Bombay and the Ghauts, and which add so materially to the grandeur of this romantic region.

A beautiful variety is brought to Bombay, containing elegant arborizations resembling the ramifications of inclosed mosses, a phenomenon which in many instances appears to be justly attributable to such a cause.*

Bloodstone, or oriental jasper, as sold in the town by the Parsees, appears also to be imported from Guzurat, and the adjacent territories. It is characterized by presenting a greenish appearance, with numerous blood-red streaks or veins traversing it in various directions. It is to the latter species, or to the mock pearls so frequently employed as ornaments by the inferior castes, that we are to refer the expression of the historian of Alexander: " lapilli ex auribus pendent."† But with regard to the " Gemmas margaritasque mare litoribus infundit," it is not easy to give a satisfactory explanation, although the latter obviously relate to the pearls of the Indian seas.

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* The remark of Pliny, "Infestantur plurimis vitiis—aliis capillamentum rimæ simile," with regard to rock-crystal, refers to the presence of Titanite. *Hist. Nat. Lib.* xxxvii. c. 2. The same naturalist observes of rock-crystal, "Oriens et hanc mittit, sed Indicæ nulla præfertur." *Hist. Nat.* xxxvii. 2. Which is ignorantly denied by Garcias ab Orto, who was for several years Viceroy of India. He says "Nullo autem expredictis loco crystallus invenitur quemadmodum nec per universam Indiam." *Hist. Arom. et Simplic Lib.* 1. c. 47, p. 171.

We proceed now to a separate sketch of the islands, in the order of their importance.

BOMBAY ISLAND.

The whole island may be considered as a plain, variegated on the east with considerable undulations, which form the small eminences termed Mazagon, Parell, and Oblong Hills. The southern part divides into two necks of land, of which the eastern portion, a low and flat surface, affords the site for the Fort and Dungeree, or the Black Town, and leaving an intermediate space called the Esplanade, terminates at Mendam's Point, the commencement of the Coulaba Causeway. The western promontory is considerably elevated, consisting principally of Malabar Hill, which lies near the entry of the harbour, and terminates at Malabar Point. Included between these points, with a crescentic outline, as between the prongs of a fork lies Back Bay, a considerable portion of water, with a sea communication, occupying a span of 2½ miles, the total mean breadth and length being about 1½ and 1¾ miles respectively. The water is shoal, having a depth of 2½ fathoms in the centre, and contains several sands, sunken rocks, and others exposed at low water.

The essential composition of this tract is claystone-porphyry and amygdaloid, and in some places, as on Malabar Hill, basalt shews itself, each corresponding with the varieties described, but seeming to vary with regard to the proportion of the basis and the magnitude of the cavities, and consequent quantity of the mineral contents. From Mendam's Point, a ledge of amygdaloid runs out south-west by south, to form a junction with Coulaba or Old Woman's Island, a flat and rocky mass, thinly covered with soil, which barely conceals the subjacent rocks, bearing every mark of having been at some period a continuous portion of that promontory of the island of Bombay upon which the town is situated. Advantage has been taken of this ledge to form a connecting causeway between the two islands, which is left quite dry at low water, so that a free land communication may be kept up in such circumstances. The prevailing rocks in this little insulated land are the same as those already mentioned, with the occasional appearance of basalt as if in dykes. At the southern point a dangerous rocky mass extends out to sea nearly three miles in length, assisting, with the aid of Tull Reef, in rendering the mouth of the harbour extremely narrow, for, if we deduct these obstructions to navigation, its span is not above four miles, although the distance from Coulaba to the nearest point of the continent equals seven miles.

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† Quint Curt Ruf. l. viii. c. ix.

The Coulaba Reef has been termed, from its forked figure, the Prongs, and appears to consist of the general rock, in a highly indurated form. The same series occurs at the New Bunder, by the Apollo Gate, where the amygdaloid appears to lie over the porphyry, which is is very hard when first exposed, and is employed as a building material. The New Bunder is formed of it; but notwithstanding the excellent quality of the stone for enduring the effects of aqueous friction, it is remarkable that an effectual plan has not been fallen upon to render the building of the jutty durable, as it is continually undergoing displacement from the action of the tide. The utility of the Bunder cannot be disputed for the numerous ships which annually increase in frequenting this excellent port, and the situation of this quay, from its being exterior to the fort, is very important, and is perhaps safer than the old Bunder during the height of the moonsoon.

To the north of the town the surface begins to rise gradually until the small eminence of Mazagon is formed. Beyond it are Parall and Oblong Hills, all preserving a rounded outline, thinly sprinkled with cocoa-nut trees *(Cocos nucifera)*, and affording some pasture land. At Baboola, a tank has been cut out of the solid rock, supplied with a broad flight of steps, to enable the inhabitants to have free access to the water, which they employ for all purposes. It is from similar reservoirs that the principal supplies of water for domestic purposes are obtained, and for the use of the crews of ships visiting the harbour.

As much discussion has taken place with regard to the influence which water procured from such sources may have upon the health of seamen, by affecting the alimentary canal, and, as the solution of the difficulties of the inquiry are very closely connected with the geological nature of the country, a few words upon the subject may not be out of place here. The whole of the soil which covers the island being extremely thin, it is obvious that the bottoms of the tanks, which are several feet below the level of the surrounding surface, must consist of solid rocks, and the margins being fortified with artificial building, we see that the water can have little opportunity of acting upon the soft soil, so as to produce a mixture of the earthy particles, and hence, that the substances of a saline nature in solution must derive their origin from the disintegrated rocky mass. A muddiness, however, generally exists in these waters, which appears to be produced by the agitation excited by the natives entering for the purpose of carrying off the water, and for bathing; but the proportion of mechanical mixture thus occasioned does not necessarily exist in general to any greatly appreciable amount, because, when the cause of excitement is removed, the commingled matter speedily subsides. The temperature is always equal or above that of the atmosphere, and in the dry season may be rated at from 80° to 86°. It affords the following results with re-agents :—

1. A solution of acetate of lead produces a copious white flocky precipitate.
2. A slight precipitation with oxalate of ammonia.
3. A muddiness with muriate of barytes.
4. A milkiness with lime water.
5. A precipitate with nitrate of silver.

From these facts we may deduce that the water contains in solution (1.) a quantity of vegetable or animal matter. Judging by the eye of the relative proportions of the precipitate by acetate of lead in the Thames and Bombay water, we should be inclined to refer the maximum to the former, and no one will affirm that the water procured from the Thames is pernicious to health.

(2.) Small quantities of
Chloride of sodium
Sulphate of lime
Carbonate of lime.

The animal and vegetable matters are derived, there can be little hesitation in concluding, from substances which readily gain admittance in consequence of the exposure of the tanks, and the presence of the saline matter must be attributed to the same sources as in other similar situations, their small proportions being explained by the want of free communication between the water and the soluble portion of the earth.

The rock of Baboola is close grained, and is extremely hard, approaching in some measure to a green stone, as it appears sometimes in Scotland, with the aspect of an aqueous deposit. It affords an excellent material for mending the roads, which for their smoothness cannot be surpassed. This rock appears limited in its range; for at Parell, amygdaloid occurs with very large cavities, filled with the usual mineral. The northern portion of the island is similarly constituted, presenting nearly a level surface, thickly clothed with a great variety of trees and shrubs,* which afford a grateful shade from the overpowering influence of the solar rays, " vim solis umbræ lævant." The coast is low and rocky with the water gradually shoaling to the land, which at ebb tide leaves a dry and pleasant beach. The amygdaloid shews itself frequently in the form of half sunk rocks and dangerous ledges, especially along the Coulaba shores, but suffering in the lapse of time from the action of the sea, and occurring remarkably in conjunction with the clay-stone porphyry, the latter often rising up between two rounded masses of the former, sometimes placed above it, at other times under it, both being traversed frequently with basaltic dykes. All these rocks at the shore may be observed covered with shells, and their surface with a decomposed powdery matter, which on inspection turns out to be the basis of the rock crumbling into dust. At the distance of two miles from the town, many of the shells which abound so profusely on the sea-shore are calcined, by which process, they are converted into caustic lime, which the natives term *chunam*, a substance in great request, both as a mortar, and as an edible rolled up in the *betel leaf*. The latter habit, which has been denominated by some writers a luxury, ought rather to be termed a necessary practice, as we find it prevailing wherever the sole articles of diet are procured from the vegetable kingdom, the different substances employed fulfilling the same end, whether it be on the coral rocks of the Pacific, the arid deserts of Africa, or the interminable forests of America.

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* Among the trees of the island, the *Ficus religiosa* and *Indica* are the most stately, which appear to have attracted the attention of Europeans, as early as the time of Alexander the Great, if we may judge from the admirable description of Quintus Curtius, " Plerique rami instar ingentium stipitum flexi in humum rursus, qua se curvaverant, erigebantur, adeo ut species esset non rami resurgentis, sed arboris ex sua radice generatæ."—Q. *Curt. Ruf.* lib. IX. c. 1.

" Branching so broad and long, that in the ground
The bended twigs take root, and daughters grow
About the mother tree."—MILTON.

The variety of trees and shrubs is great, but perhaps, the finest ornaments are, *Morinda citrifolia*, *Capparis acuminata*, *Artocarpus integrifolia*, *Terminalia alata*, *Getonia floribunda*, *Michelia champaca*, *Mimusops elengi*, *Grewia microcos*, and *Orientalis*, *Annona reticula* and *squamosa*, and *Tamarindus Indica*, which if any members of the vegetable kingdom can be considered as indigenous in this island, must hold the highest rank.

SALSETTE ISLAND.

The description of the geological structure of one of these islands, may be said to include almost the particulars of the whole, but for the sake of greater perspicuity, we have ventured to consider them separately. The essential composition of Salsette, is clay-stone porphyry and amygdaloid, corresponding with those rocks in Bombay, but basalt occurs in very considerable tracts, and assumes more decided forms. The island is very irregular in its surface, consisting of ridges and intervening valleys, which in combination afford agreeable scenery.

The basalt forms two ridges which run parallel to each other, the one on the west and the other on the east of the narrow strait which separates the island from the continent, appearing above the amygdaloid which forms the base of the hills; and therefore, leading us to conclude, that its ejection has been subsequent to that of the amygdaloid.

The alteration which the eruption of the basalt has produced on the masses through which it has been forced, by rendering the two rocks at the point of contact similar, and as if passing into each other by a gradual transition, are sufficiently obvious; but at the same time, the two varieties are as distinct as any of the projected series in general appear, so that in a theoretical nomenclature (the establishment of which, it must be admitted, it not for the advantage of science), not only the varieties of the trap formation should be discriminated, but the whole group should have an appellation, indicative of its production at a distinct period, and under different circumstances, from modern volcanoes. The term subaqueous volcanic rocks, expresses the hypothetical nature of their ejection.

In the centre of the island are situated the celebrated temples of Salsette, or rather their remains, since they have received great mutilation, not from the influence of natural causes, which from the hardness of the rock of which they are formed, they are calculated in a great measure to withstand, unlike the polished remnants of Greece and Rome, which are daily dissolving in the very rains which nourish the earth,[*] but from the hands of barbarous men.

It is not our purpose to describe them; it is sufficient to refer to accurate details respecting their appearance and size, which have afforded subject of admiration to numerous ages.[†] They are literally caves in hills, composed of porphyry and amygdaloid, thus differing from the pagodas on the coast of Malabar which consist of black basalt.[‡]

The Portuguese, who were the first European settlers in this country, justly merit the high degree of reprobation, which has been attached to their conduct, in the destruction of these extraordinary antiquities, for they must have been infatuated with the most determined intention of mutilation. The date of this dilapidation may be reckoned about the year 1564; as we learn from the historian of that period; that D. Antony de Noronha, the 9th Viceroy, and 23rd Portuguese governor of India, who succeeded John de Mendoça in 1564, and held the office till 1567; finding the people incorrigible, notwithstanding the exertions of the religious of the society of Jesus, who had laboured indefatigably for the conversion of infidels, and had sent some of their number into the island of "Salsette," which contained 66 villages of pagans; destroyed all their pagodas to the number of 200.[§] The soil in this neighbourhood is highly improvable, if we may judge from the flourishing appearance of the gardens at Powey, and the quantity of produce raised. In the low valley which runs towards the centre of the island, the surface is completely covered with a coating of salt, left by the evaporation of the sea-water, which periodically inundates the low ground. This salt in its impure state is employed as a condiment by most of the natives and naturalized inhabitants of the neighbourhood. Without drawing any very general or sweeping conclusions, from the fact of the existence of a recent salt deposit in this situation, we cannot fail to remark, that an extensive formation is actually in the course of being produced, for the product of the disintegrated rocks, will obviously be spread successively over each saline residuum, and as each new bed is laid, the substrata will acquire additional firmness and solidity, combined with the agency of the high mean temperature, which the most trivial observer will detect as a powerful agent in tropical countries, in binding together the most arid particles.*

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[*] Davy's Consolations in Travel, Dialogue vi.; p. 266.

[†] Gemelli Careri, vol. iii. p. 36. Asiatic Society Trans. vol. iv. Sousa notices a tradition that a subterraneous passage exists between "Canari," and Cambaya, running under the sea, which was the work of Bimilamansa, who was king of all that country in the third century. Others attribute the work to the holy prince Josaphat. F. Antony de Porto, a Franciscan, is said to have travelled for seven days in this passage, without arriving at its termination. Sousa's Asia, tom. ii, 258, 395.

[‡] Sonnerat Voyage aux Indes, tom. ii. c. 4.

[§] "Portuguese Asia, by Manuel de Faria y Sousa, translated from the Spanish by Capt. John Stevens." Lond. 1695, 3 tomes 8vo., tome iii. p. 14, tome ii. p. 253. The original title of the work is Asia Portuguesa, 3 tom, fol. Lisboa; 1666-75.

This valley is formed by a break in the continuity of the basaltic ridge, the southern portion of which terminates here, but resumes its altitude and course near Tanna. The vale is overlooked by the hill which forms the extremity of the ridge. The ruin of a Portuguese chapel crowns its summit, consisting of the basalt, (a gray rock with augite crystals interspersed, which forms its foundation, No. 1). At the base of the ridge near the shore is a similar ruin, built of porphyry, and at each of them there is a corresponding inscription on sand-stone tablets, which must evidently have been procured from a great distance.

The words of the inscription are contracted, and are in the Portuguese language. They relate to some individual of the name of Aquias, probably a priest, as the word *sevsesdres* occurs; and the dates of the 2d of April 1620, and 28th November 1630 appear.

Near it is situated a Mahometan garden, neatly laid out in the English style, with grass walks, flower and vegetable borders, and a variety of fruit trees.

The ascent to the summit of the hill is rendered difficult, by the abruptness of the declivity and the loose fragments containing mesolite, chalcedony and quartz nodules, which readily yield to pressure, and roll to the base of the hill. The degradation of rocks cannot better be observed than in this neighbourhood, where we see them comminuting, rolling to the base and assisting in elevating the level of the valleys, and diminishing the relative height of the hills, of which a similarly striking illustration is afforded at the north-west side of the Pyrenees.† The product of this disintegration is well expressed by the German epithet, *geschiebe*, the *ratchill* of the miners, and must necessarily constitute the most recent formation wherever it occurs.

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* Some distinguished geologists have attributed the colour of the red sand-stone to the ferruginous parts of the porphyry, from whose disintegration, they consider this formation to be derived. Humboldt Essai geognostique sur le Gisement des roches, 2nd Edit. Paris, 1826, p. 203.

† Link's Travels in Portugal, 8vo. 1801, p. 64.

From the summit of the hill the prospect is very fine, the east view being bounded by those extraordinary trap mountains whose configuration is so well expressed by their names, Funnel Hill, and the Queen of Mahratta's Castle, with the connecting ridge of the ghauts. While, to the south, the harbour and islands of Bombay appear as if at the feet, and to the north, the dull high land terminates the prospect, the foreground being enlivened by the rich foliage of the tamarind (Tamarindus Indica) and lofty palmyra, (Borassus flabelliformis) and the more humble, though not less elegant jungle, consisting of the Ixora (Ixora coccinea), Euphorbia (E. neriifolia), and Lawsonia (L. inermis).

On the north-eastern side of the strait which separates Salsette from the continent, a low basaltic ridge extends for four or five miles parallel with the ridge of Salsette, and with the ghauts, presenting, wherever the rock is uncovered, a columnar structure, and in three places, clusters of columns rise up, some of which are fifty feet high and twenty inches in diameter, the shafts being variously four or seven sided.*

ELEPHANTA ISLAND.

The form which this island presents at a distance is somewhat pyramidal, but on a nearer approach it is found to consist of two distinct hills, with an intervening valley. This vale is profusely studded with trees and bushes, as well as the hills, which are clothed with wood from the water's edge to the summits. Many of the trees are tall and stately, as the brab or palmyra, while others are covered with the densest foliage, as the tamarind, with its rich green leaves and elegant blossoms. In the dry season the island exhibits the best appearance from the summits of the hills, or by approaching it from the sea, for at that time the earth is dry, parched, and as if baked, being crossed in every direction with fissures, which greedily suck up the rain whenever it happens to fall, and, of course, is destitute of that rich vegetable carpet which covers it during the prevalence of the monsoon. Then the soil is one mass of verdure; not a spot is naked; the paddy ground being enlivened with the presence of the rice crop, and the forest waste adorned with grasses and elegant flowers. The rice ground is very limited, and is situated at the lower part of the vale, in the immediate vicinity of the village of Gallipooti. It is divided into parterres, or small inclosures, fenced with impervious hedges of pricklypear (*Euphorbia neriifolia* and *tirucalli*). The whole island is one mass of rock, and the thin scattering of soil which hides but scantily the main constituent of the island, is merely derived from the disintegration of the latter. At the southern landing place there is a ledge of large masses of amygdaloid (of which the cavities have been washed empty, if we except a few nodules of quartz), over which the surf beats high and renders landing dangerous, although it forms one of the few situations in these islands, where boats can reach the shore without grounding.

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* Ann. of Philosophy, vii. 309.

Near this landing place is a Portuguese ruin, situated on a knoll; and adjoining it, we discover the extraordinary artificial figure from which the island derives its European name, for its Hindoostani name is Gallipooti. The animal represented by this sculpture is evidently an elephant, fully equal to the natural size, and, upon the whole, well executed. The trunk and head have been separated from the body, and lie fractured and prostrate on the ground. Considerable damage has been done to other parts of the figure, for the instrument of which we must have recourse to the tradition current in that neighbourhood, which states that the Portuguese went so deliberately to work as to employ cannon in effecting their barbarous work of destruction, from the idea, as we have shewn, of extirpating superstition! The rock of which the figure consists is a very hard basalt, containing a few minute cavities, scantily supplied with mineral crystals, and is of the same nature as the rock of the adjoining hillock. From this spot the ascent of the western hill is pretty easy, the pathway leading along the bed of what constitutes a torrent during the wet season, formed in the porphyry and amygdaloid, and runs to a considerable depth; a kind of natural walls rising up on each side, which are overshadowed by carissa bushes (Carissa carandas), agnus castus[*] (Vitex trifolia), the garruga tree (Garruga pinnata), with its abundant fruit hanging in clusters, like the produce of the vine, and castor oil tree (Ricinus communis), while the soil is ornamented with the solanum (Solanum jacquini), and the Mexican Argemone[†] (Argemone Mexicana). About half way up the hill, the smaller temple or caves are reached. They are three in number, having the face of the rock polished perpendicularly, and some pillars formed on its surface, with several figures represented flying in the clouds. The inferior part of the rock consists of a variegated porphyry, sometimes reddish, and frequently of a yellow tint, the basis consisting of clay, and the inclosed particles of altered quartzoze grains, &c.

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[*] The leaves of this shrub are employed by the Hindoo women in some religious ceremony, as I found a quantity deposited on the convex stone in the lateral square compartment of the great temple.

[†] The occurrence of this plant, (a native of the New World), wherever the Portuguese have formed settlements, is a striking instance of the agency of man in the distribution of vegetable species. In addition to the habitat here given, I have observed it at Malabar Point in Bombay Island; on the Island of Coulaba; and at the south end of the town of Macao, in China, in all of which localities it is an abundant plant, affording a parallel case with that of the Chenopodium ambrosioides, (cited by Lyell, vol. ii. p. 83.) which we observe so abundantly in the Island of St. Helena.

Remains of painting are still observable, which seems to have originally been of a red colour, but has in some places faded to a purple hue. The upper part of the rock, commencing at the roof of the apartments, is composed of amygdaloid, having a wacké basis, and containing cavities filled with rock-crystal, calcarious spar, zeolites, and many other minerals which a careful examination would readily detect. During the rains these caves are filled with water. The whole face of the hill above these caves is craggy, consisting of amygdaloid, porphyry occasionally appearing, and is covered with thick jungle, and climbers ascending the stems of the numerous trees. Among the former we chiefly remark the Dalbergia scandens, and among the latter, the Getonia floribunda, with its bunches of flowers.

The path, continuing to wind up the declivity, conducts, after passing a fine specimen of the tamarind tree, and of the Asclepias gigantea, to the great temple which faces the north. Like the lower antiquities, it is an excavation in the solid rock, with, however, a much greater extension of human art, for the space included within the walls of the large apartment is a square of 43 yards*, and 18 feet in height, supported by three rows of pillars, consisting of rounded fluted capitals and square shafts. The walls are covered with gigantic figures, all of which have been mutilated, with the exception of the colossal representation of the *Trimurti* fronting the entrance, and one entire masculine form in the recess to the right. The rock is amygdaloid occasionally assuming a purely porphyritic appearance. The effects of the atmosphere upon the more exposed portions of the rock are obvious, for it is evidently decaying and crumbling to powder, and, combined with the ravages produced by visitors, would, in the lapse of time, prevent the probability of any remnant continuing, had not the foresight of the honourable governors of the country obviated the latter cause in some measure, by stationing a resident sergeant to guard these interesting relics. The rock, when first exposed, is highly indurated, and difficult either to fracture or polish, both of which circumstances add greatly to the wonder and admiration with which we must view the temple and sculptures.

In geological investigations, not the least interesting inquiry consists in observations with regard to the degradation of the rocky masses, and the formation of the soils for the growth of the members of the vegetable kingdom. Such questions, it is obvious, can be most satisfactorily solved on insulated lands, where no agencies save the pure natural causes can come into operation. Coral islands, which are of such recent formation, present the most simple illustration upon this point, where we find the calcarious masses splitting under the action of the sun's rays, crumbling and affording a scanty soil for foreign seeds floated by currents to take root, and thus to extend the formation of the soil, by the loosening power of their roots and the fall of their leaves.*

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* This number is derived from the resident sergeant. I made it forty-six paces.

The heat of the sun alone may be considered, therefore, a powerful auxiliary in the production of soils, and this influence is especially applicable to the Indian climate, where the dark hue of the rocks greatly favours the imbibition of heat; an observation similar to that which was made by Link, with regard to the black slates of Pezo,† and subsequently by Humboldt, was demonstrated in reference to the black bare rocks on the banks of the Oroonoko, whose temperatures were found to be elevated during the day 34½° F., and during the night 18° above that of the atmosphere‡. In India, at the termination of the rains in September, the porous stony masses must of course be saturated with moisture, and when the rays of the sun excite their influence, and are imbibed, the water must necessarily be vaporized, and disintegration of the rocky masses ensue. This effect of vapour must be considered as a powerful agent, although not so explosibly effective as the freezing of water:

> ———" cum tristis hyems etiamnum frigore saxa
> Rumperet."§

Because, in one case the confined body has some means of egress, though far from free, while, in the other, the barriers must yield on every side to the overwhelming mass within. When the soil is carefully examined, all the appearances confirm the idea of its derivation from the rocky mass. It has a black colour, which it may in some measure derive from particles of oxide of iron, which are occasionally observable in the porphyry where it has begun to decompose, and from the vegetable matter derived from the trees. No considerable portions of iron have been detected in this neighbourhood, although the oxide of that metal is found in considerable abundance among the ghauts, and is smelted with some profit at the Mahabuleshwur hills||. In consequence of the mixture of vegetable matter with this light rocky production, the soil has been rendered fit for raising some scanty crops, which serve to

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* Dr. R. Forster has well described the structure and mode of formation of coral islands, in Cook's Voyage, of whose accuracy the present writer had ample proofs, while examining similar deposits on the coast of Sumatra. A fuller, but not more distinct, account of coral islands is detailed in Beechy's Voyage.

† Link's Travels in Portugal, 8vo. 1801. p. 64.

‡ Humboldt's Pers. Nar. vol. v. pt. i: 26.

§ Virg. G. iv. 136.

|| "Account of the convalescent station of Malcolm Peit on the Mahabuleshwur hills," Bombay, 1830, pamphlet. The chemical nature of the ore is not stated in this publication, but it is probably the magnetic iron ore.

support the inhabitants of the island, who amount to about a hundred. It is a curious fact in the history of this island, that no water can be obtained by sinking wells near the beach, and that the sole supply of the inhabitants is procured at the summit of the hill, where a cool spring exists in a dark cave near the great temple, affording a plentiful supply, from which it is conveyed by the Hindoos to their habitations in porous earthen vessels.

CARANJA ISLAND.

This is a large island, situated the most southerly of any in the harbour. It consists of two hills, with an intervening valley. The best landing place is situated on the north-east side of the island, at a fishing village, where, however, the water is very shallow, and where it is necessary, in order to effect a landing, to employ a native canoe. The shore here is bounded by rocks, as at Elephanta, of the amygdaloid species. The shingle consists of bivalve shells (Arca granosa) and waterworn porphyritic gravel. The ascent of the lesser Caranja hill is gradual and easy from the village to the summit of the ridge. The rocks have an inclination to the east and west, as if shelving down on each side of the ridge, presenting the appearance of stratification, or successive deposition, and are covered with low jungle of carissa, ixora, euphorbia, and lawsonia. The descent on the west leads to paddy ground, where there is another village, surrounded with neat gardens, and supplied with a tank, fifteen or twenty feet in depth, dug out of the solid rock, with a wheel and earthern pots to raise the water, as is usual in the east. In this valley there is a fine specimen of the Adansonia digitata, sporting a colossal trunk, and spreading out its branches to overshadow the circumjacent cultivated ground.* To reach the top of the ridge it is necessary to cross several mountain streams, whose beds are dry except during the rainy season. The rocks are all amygdaloid, on the western as on the eastern declivity, filled with zeolites, &c. and are well exposed in the streamlets, sometimes rising in the form of round masses, at other times shelving out and affording a level run for the water, and then terminating in a small perpendicular fall at the edge of the rock.

On the eastern side, in this manner, a very picturesque waterfall is formed, the height of the vertical face of the rock being at least twenty feet, over which the whole water of the torrent is precipitated in one sheet, presenting altogether, with the rich foliage of the tamarind in the foreground, a pretty scene. Near this a specimen of mesolite was obtained, among innumerable minerals, which may be observed scattered about on the surface of the island, very frequently covered with a blue coating, produced by the presence of iron. Besides mesolite I observed chalcedony, agates, rock-crystal, calcareous spar, and heulandite.

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* In this valley I found a specimen of the Agaricus campestris, the identical English ketchup mushroom, of the existence of which plant, in this part of India, at such a slight elevation above the sea, I have never previously heard.

The south-east point of the small hill consists of craggy rocks of porphyry, affording, in their numerous recesses, abundance of hiding places for lizards and serpents, especially the cobra de capello, which is extremely frequent in these islands. The clefts also afford good habitats for the fern Gymnogramma chylomelanos, and the Asparagus sarmentosus.

The large Caranja hill is similar in its conformation to the smaller hill, and is crowned by the ruins of an old fort, which was a place of considerable note, when Europeans first settled on this coast.

At low water the island is connected with the continent, the intervening valley being quite green, and studded with a few pools of water. The vale which separates the two hills, and divides the island into two parts, is covered with palm trees, amid which are situated cottages and rich gardens, at a small elevation above the level of the sea.

General Observations.

In the course of the preceding remarks it appears that, on the continent and along the coasts of the different islands, the soundings do not deepen suddenly, but that the water at the shore is shallow, and that it gradually increases in depth in proportion as we recede from the land. The same remark applies to the whole coast, from the Persian Gulf to Cape Comorin, and it is on a careful attention to the depth of water and the nature of the bottom, that navigators in stormy weather must depend. In the latitude of Bombay this remarkable submarine portion of land which can thus be reached with the lead, attains an additional degree of breadth, jutting out to a greater extent into the Arabian sea, and, from its occupying such a considerable space, and affording good fishing ground, although it can only be considered as an expansion of the shoal water along the coast, it has been termed the Bank of Soundings. The deposit generally obtained in the bottom of the harbour, and on this bank near the coast, consists of a blue clay of a stiff nature, and is, therefore, serviceable by affording good holding ground for anchors. A section, representing the relative situations of the sea and the Bank of Soundings, will explain the subject more clearly than can be expressed by detailed descriptions. The horizontal line (See plate 18), represents the sea level, and the inclined one the bottom of the ocean, which is here shewn to be a gradual descent from the summit of the high land. By sounding regularly, we discover our distance from the coast, as appears from the following table:—

10 miles from the coast the soundings are 14 fathoms; bottom, mud.

40 do. 40 fms., sand, gravel, and shells of various colours.

50 do. 45 do. do.

160 do. 50 do. do.

170 do. 55 do. do.

We observe, therefore, that soundings extend as far to the westward of Bombay as 2° 50′, and that, until the bottom of the ocean begins to ascend, in order to come to the day; the bed consists of sand, mixed with shells, and that then it is formed of mud. An observation with respect to the nature of the shells would be of considerable importance, because it might enable us to decide, whether they are natives of deep water, or belong to the shallower parts of the ocean.

Two explanations occur, to account for the appearances here described: either, 1st. That the land and ocean have retained their positions relative to each other since the formation of the first, the production of the bank being similar to the clay deposit round the shore of the island which so lately appeared, and sunk in the Mediterranean; or 2d., That the harbour of Bombay was formerly a valley, and that the Bank of Soundings was at one time dry ground, both of which have been submersed by the gradual encroachment of the sea. The most undoubted evidence exists to show us that this coast has been, even within the range of a few centuries, subjected to violent convulsions from earthquakes.

In May 1618, six years after the settlement of the English at Surat, "a general and diabolical storm" occurred in the neighbourhood of Bombay (*Bombaim* as it is termed by old writers). It began at Baçaim (Basseen), on the 15th of that month, and continued with such violence that the people hid themselves in cellars, in continual dread lest their dwellings should be levelled with the earth; and at 2 A. M. an earthquake destroyed many houses. The sea, according to the historian of the time, was brought into the city by the wind; the waves roared fearfully; the tops of the churches were blown off, and immense stones were impelled to vast distances; two thousand persons were killed; the fish died in the ponds; and most of the churches, as the tempest advanced, were utterly destroyed. Many vessels were lost in the port. At Bombay, sixty sail of vessels, with their cargoes and some of their crews, foundered.

At Agaçaim, a boat was blown by the force of the wind from the sea into a house, where it killed a woman and her child, and the trees were torn up by their roots.

Besides the presence of a violent commotion in the atmosphere, and the powerful concussion of the earth, volcanic action seems to have occurred, if we may be allowed to deduce such an inference, from the highly embellished representations of the historian, of giants seen in the air throwing great globes of fire at each other, confusions of human voices in the atmosphere, tramplings of horses, and the sound of warlike instruments. It is added that much of this nature occurred in " Salsette" and other places.*

The metaphorical figures expressed in the latter part of the description, are strikingly similar to those employed by Dion Cassius† in his account of the eruption which destroyed Herculaneum and Pompeii, where we are told that giants were seen, and the sounds of trumpets were heard in the vicinity.

Frequent mention of earthquakes may be found in the history of the Malabar coast (which extends from Cananore to Cochin, about 42 leagues), where they go under the denomination of *Bhumiculacam.* In 1784, a strong concussion was felt, and in the province of Nagaracotta, as well as on the bank of the river Sarayuva, volcanic appearances are evident. But the most remarkable changes are to be found in the vicinity of Cochin. On its north side we find the Island Vaypi, which was thrown up by the sea about the year 1341. The soil upon this new formation resembles that of the flat districts of Malabar, which consists of sea sand and calcarious matter, combined with clay said to be washed down from the ghauts. The production of Vaypi gave rise to a new era, termed *Puduvepa* (new introduction). In the same neighbourhood, Bartolomeo informs us, that he was witness to the formation of an island, a mile in length, in the course of ten years before the church at Celtiyatti, by the opposite effects of river and sea water, which may be explained in the following manner: During the months of August and September, if the rains have been abundant, the waters of the river clear away from its mouth, those sandbanks which have been formed during the height of the monsoon, in June and July, by the high sea which then rages in a boisterous manner; but if the rains have been scanty, and the force of the river is not sufficient to carry away the obstruction of its junction with the waters of the ocean, an inundation of the adjacent country ensues; the inhabitants are driven from their dwellings, and so frequent is this occurrence, that we are told grandchildren can scarcely point out, with any certainty, the spot where their grandfathers resided, in consequence of the change in its appearance.

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* Sousa's " Portuguese Asia," tom. iii.

† Hist. Rom. lib. 66,

Contemporaneous with the appearance of the Island of Vaypi, the waters which during the rainy season are discharged from the ghauts, broke through the banks of the river Cocci, and overwhelmed a village of the same name with such impetuosity as to sweep it away, and formed in that district a river, a lake, and a harbour so spacious, that very large ships can now lie in security on the north-east side of Cochin, where the river runs into the sea.*

According to the Hindoo records, the ocean has made great inroads upon the opposite shore of India; for, it appears, from the researches, of D. Duante de Meneses, Portuguese governor of India in 1522, among the native writings, that "Miliapore," seven leagues from "Paleacate," the ruins of which were then on the sea shore, was surrounded, according to tradition, 1500 years previous to that date, by 3,300 stately churches, and that the site of that most ancient city was distant twelve leagues from the sea. We are also informed that "St. Thomas dragged out of the sea an immense mass of timber, which all the force of elephants and art of men could not move."†

In the figure which we have given, it is evident that the inclined plain at the land has been comparatively but recently submersed, while the horizontal bed has been for a longer period subjected to the action of the sea, as is evinced by the layer of sand and shells. The whole of this horizontal portion, likewise, we may decidedly conclude, was inundated at the same period, for, after the sea had been raised to the level of forty-five fathoms from the present surface of the ocean, we can see no impediment to its laying the whole plain, extending for at least a hundred miles of longitude, completely under water.

The Hindoos, on the Malabar coast, have a tradition that the sea extended to the foot of the ghauts. There does not appear, however, evidence tending in any degree to prove that such an occurrence has been of recent date; but we are rather disposed to consider the native account, as an indistinct remnant of the almost universal tradition of a deluge during the human era.

The agencies of torrents appear of too trivial a nature, to afford a sufficient source of such an extensive submarine formation, as that which we observe along the Concan and Malabar coasts, although there can be no hesitation in admitting that where considerable rivers do exist, the *debris* collected by the force of their currents must prove a serious obstacle to the encroachments of the ocean. But at Bombay where the bank is much broader than in other parts of the coast, no remarkable accumulations occur at the mouths of the rivers Panwell and Pen, whose size, indeed, is sufficient to render such an occurrence extremely improbable, even if actual examination did not demonstrate the fact to be as we have stated; and the extensive portion of land in Salsette, which is dry at low water, is situated beyond the influence of any current save that of the tide, which it must be admitted, however, is extremely powerful.

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* Viaggio alle Indie Orientali da F. P. da S. Bartolomeo, Roma, 1796, 8vo. English translation from the German of Dr. R. Forster, 8vo. 1800.

† Sousa's "Portuguese Asia," tom. i. 270.

There seems no reason, then, for supposing that this bank has been formed by matter forced down by the agency of running water from the ghauts, as some have concluded, because, it exists where there are no rivers to produce accumulations, and it is broadest at the mouths of the smallest rivers.

In bringing forward proofs of extensive changes and violent convulsions, we have endeavoured to exclude theoretical considerations, and probability is only implied when we observe that the different islands in the bay may have been the continuation of the high land in Salsette and Tull, whose communications have been submersed, and whose basis are now washed by the overwhelming waters of the ocean. *Records of General Science.* April and May 1835.

2.—*Catalogue of Plants collected at Bombay.—By* John Graham, Esq.

We believe this to be the first attempt at communicating any information with regard to the botanical productions of this beautiful part of the western peninsula of Hindostan. The catalogue constitutes the gleanings of a few occasional minutes snatched by our excellent friend (with whom we have spent many a pleasant hour in botanizing amid the sylvan recesses of India) from the ingrossing avocations of his official duties. He has set an example which those who possess more spare time would do well to imitate.—Edit. *Records.*

1. Alpinia *nutans.*—2. Achyranthes *aspera.* A common weed.—3. Asclepias *gigantea.* Very common throughout India. The natives apply the milky acrid juice to sores.—4. Asclepias *acida.* This is a rare plant; I found it last August (1834) on the plains to the south of Aurungabad; also in the neighbourhood of Poona.—5. Asclepias *annulare.*—6. Asclepias *formosissima.* I have only seen this species in gardens, but, I believe, it is a native of India.—7. Asclepias *odoratissima.* This too I have only seen in gardens, and very rare.—8. Amaryllis *Zeylonica.* A very beautiful plant; I do not think it is to be found within this neighbourhood.—9. Asparagus *falcatus.* Large bushes of this shrubby species are common in the Deccan; it requires support and is generally found overtopping some other shrub; it is rather a pretty plant.—10. Aloe *littoralis.* The fibres of its long leaves

are extremely tough and might be used in making cord, if not cloth; however, I am not aware of its being applied to any economical uses.—11. Anacardium *occidentale.* Cashew nut; common in Salsette and on the island of Bombay, &c. The apples are seldom used, indeed they are not worth eating.—12. Adenanthera *pavonia.*[*]—13. Adenanthera *aculeata.*—14. Averhoa *bilimbi.*—15. Averhoa *carambola.* Both species are common in gardens, and the fruit is used for making tarts. The fruit of bilimbi grows from the thick branches and often from the stem of the tree in a singular manner, like the jack fruit. The carambola is called *kurmul* by the natives, a word which signifies sour or sharp tasted. —16. Argemone *Mexicana.* A common weed, if not a native, it is, at least, completely naturalized.—17. Alangium *6-petalum.* Grows on Elephanta.—18. Anona *squamosa.* Custard apple, very common throughout India. The fruit is used as an article of food by the natives in times of scarcity; it is produced in great abundance with the slightest care; the tree seems to grow indifferently on all soils and situations. —19. Anona *reticulata.* Bullock's heart, so named from the shape of the fruit, which is also eaten, though it is inferior to the custard apple. The flowers have a very sweet smell, something like the finest flavoured pears. This species is not nearly so common as the other. It is generally to be found planted near temples along with the other species. They call them *ram vhool* and *ceta vhool,* in honour of a heathen god and goddess; vhool means flower.[†]—20. Adansonia *digitata.*—This tree appears to be naturalized. Several of them grow on Bombay Island, throughout the Concan and in Guzurat. I do not think any use is made of the fruit; the tree assumes a very fantastic shape, the trunk very short and rapidly tapering; it attains a great size.[‡]—21. Abrus *precatorius.* A climber common in the edges and jungles; when the pods open and display its red bead like fruit, it looks very pretty. The natives use the seeds for weights, and call them *gooneh.*—22. Artemisia *Indica.*—23. Aristolochia *Indica.* This is a rare plant, with dingy looking flowers and leaves. I found it on Malabar hill and Cross Island in the harbour. Humboldt tells us, the South Americans use the flowers of some of their gigantic species for hats.—24. Artocarpus *incisa.* Bread fruit tree. I only know one tree on the island, it grows well and produces fruit, of some of which I have eaten. In times of scarcity it would be an invaluable tree, and as the soil and climate appear to suit it well, it is a pity that it has not been commonly planted. Its congener the jack fruit (*A. integrifolia*) is in common use among

[*] This elegant flower (termed the *peacock flower*) forms a prominent part of the *bauquet,* with which the Musselmans present Europeans on Sundays.—Ed.

[†] The author states in a letter to me that "the properties of Indian plants are little known, and no dependence whatever can be placed on native names. In fact very few have any place in their nomenclature. They are *Jungle ka vhool,* i. e. wild flowers."—Ed.

[‡] There is a fine specimen of this tree in Caranja Island. See Records, vol. i., 336.—Ed.

the natives, who call it *plumus*, and the wood of the tree is more used than any other for making household furniture. The tree attains a large size in Malabar; I have seen a single fruit larger than the largest turnip at home. When growing on the stem of the tree it has something the appearance of a hedgehog stuck to it.—25. Amaranthus *tricolor, tristis, oleraceus,* varieties, I suspect; *bajee* is the native name, red, green, and variegated. They are extensively cultivated and eaten like spinage.—26. Arum *campanulatum.* Native name *soorun.* The root somewhat resembles a pine-apple, but it is globular. It is used by the natives instead of yams; I have tasted it; it is rather coarse.—27. Arum *esculentum.* Much cultivated by the natives who make use of the tubers in their curries, &c.—28. Arum *polyphyllum.* Very common, springing up on waste land during the rains.—29. Acalypha *Indica.*—30. Areca *catechu.* A very graceful looking tree extensively cultivated for the nuts (betel) which are chewed by the natives.—31. Andropogon *schoenanthus.* Sweet lemon grass, grown in flower-pots.—32. A. *Ischaemum.*—33. A. *Nardus.*—34. Adiantum *lunulatum.* A fern covering old walls during the rains.—35. Avidcennia *tomentosa.* Very common in salt marshes. I have seen it as large as a middle sized tree; it adorns the banks of creeks and rivers, growing in the water as well as out of it.—36. Acanthus *ilicifolius.* Sea holly. Looks pretty when in flower (dark blue colour); grows common among the Avidcennia plants.—37. Artabotrys *odoratissimus.* I have only seen it in gardens; it is a pretty scandent evergreen plant, with very sweet smelling but insignificant looking flowers, as all the Annonaceae have. Decandolle calls it Unona *uncinata.*—38. Aegiceras *majus* or candel. Found common in salt marshes; it has pretty dark green leaves with white flowers.—39. Argyreia *cuneata* Sprengel. A shrub with very beautiful bluebell looking flowers. When near any support it is scandent and sends out long slender branches. Roxburgh refers it to genus Lettsomia. I have only found it on a range of hills about twenty-four miles west of Poona, near Wurgaum. It is grown as an ornamental shrub in the gardens at Poona, but I have never met with it here.—40. Agave *America.* I have only seen it in gardens at Seroor and Aurungabad.—41. Agrostis *linearis.* A common grass.—42. Anthericum *tuberosum.* Springs up during the rains on rocky waste land.—43. Boerhaavia *diffusa.*—44. Beorhaavia *erecta.* Found about 30 miles N. E. from Poona. Stems woody, as thick as a man's finger.—45. Basella *alba* and *rubra.* Varieties cultivated as root herbs; the leaves are thick and succulent, and afford an excellent substitute for cabbage.—46. Bromelia *ananas.* Pine apple.—47. Bambusa *arundinacea.* Common and well known bamboo.—48. Bryophyllum *calycinum.* Growing in cocoanut groves; rather pretty when in flower; grown in flowerpots as an ornamental plant.

49. Buhinia *speciosa.*
50. „ *candida.*
51. „ *variegata.*
52. „ *parviflora.*

Trees with pretty flowers particularly the *variegata.*

53. Bergera *Konigii.* Cultivated for its leaves which the natives use in curries. The native doctors use the bark and roots as a stimulant.—54. B. *integerrima.* Found near Panwell on the main land.—55. Bassia *longifolia.* A common tree. The intoxicating spirit called mowra is distilled from the flower. Oil is also expressed from the seeds. It is a very common and useful tree. The oil obtained from the seeds is extensively used for adulterating glue.—56. Bignonia 4-*locularis.* Common in the jungles, and somewhat resembling the ash. The white flowers rising from the ends of the branches look showy at a distance, but cannot bear inspection. 57. Bignonia *spathacea.*—58. Bignonia *radicans.* I have only found these two in gardens; both have pretty flowers, particularly the latter; it is a shrub of very slow growth, and was brought from China, I believe.

59. Barleria *pronilis.*
60. „ *longifolia.*

Common on waste lands.

61. Barleria *cristata*[*].—62. Bombax *pentandrum.*–63. Bombax *heptaphyllum.* The first I have only seen in gardens; the latter is a very common tree. Both are deciduous, and the numerous large glowing red flowers of the latter make a very showy appearance when the tree is totally destitute of leaves. February and March are its flowering months. The cotton, I believe, which it produces is of no value.—64. Butea *frondosa.* The immense clusters of red coloured pea flowers which this tree produces, have also a very showy appearance—they come before the leaves,—independent of the flowers, the tree has nothing to recommend it in the way of beauty. It is not very common; several grow in Elephanta.—65. Butea *superba.* A very strong climber, with far more splendid flowers. It grows on Salsette—rare.—66. Bryonia *grandis.*—67. Bryonia *scabra.*—68. Borassus *flabelliformis.* Tall palmyra tree; common.—69. Borago *Indica.* A very common annual springing up in the rains.—70. Bignonia *Rheedii.* I have only seen one tree. The flowers grow on a scape five or six feet long, and give the tree a curious appearance at a distance.—71. Canna *Indica.*—72. Costus*s peciosus.* Found it on a hill near Wuzaum Poona road.—73. Curcuma *montana.* Very common on the top of the ghauts. A species of arrow-root is made from it.—74. Cissus *viliginea.*—75. Cissus *carnosa.*—76. Cissus 4-*angularis.*–77. Cissus *ripanda.*–78. Cissus *crenata.*–79. Convolvulus *speciosus.* Elephant creeper.—80. Convolvulus *batatas.* Extensively cultivated.—

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[*] I have picked specimens of this plant in Dane's Island, Whampoa, China. A very good figure of it is given in Osbeck's voyage to China—a work which those who write on the botany of that country should not fail to consult.—EDIT.

81. Convolvulus *turpithum.*—82. Convolvulus *grandiflorus.*—83. Convolvulus *paniculatus.*—84. Convolvulus *pes-caprae.*[*]—85. Convolvulus *tigridis.*—86. Convolvulus *muricatus.* There are several other species of convolvulus common, but I have not been able to identify them.—87. Coffea *Arabica.* In gardens only.—88. Capsicum *annuum.* Commonly cultivated in gardens.—89. Capsicum *frutescens.* Ditto.—90. Cocculus *cordifolius.* —91. Cicer *arietinum.* Extensively cultivated in the Deccan and Guzurat. The grain plant. Horses are fed with it instead of corn.—92. Celosia *margaritacea.* An annual, springing up every where in the rains.—93. Carissa *carandas.* Curwund of the natives; a very common shrub strongly armed, and producing black berries about the size of a sloe, which are eaten raw, or made into jellies, &c.—94. C. *spinarum.* Berries red. This species I have only seen in gardens.—95. Cerbera *thevetia.* Only in gardens.—96. Ceropegia *tuberosa.* Very rare, I have only once seen it on Malabar hill.—97. Crinum *asiaticum.*—98. Cardiospermum *halicacabum.*—99. Cassytha *filiformis.* Common in jungles.—100. Cassia *fistula.* Elephanta and Salsette.—101. Cassia *Sumatrana.* In gardens only.—102. Cassia *auriculata.* Very common in the sterile parts of Deccan.—103. Cochlospermum *gossypium.*—104. Cochlospermum *serratifolium.* In gardens.—105. Coreopsis *tinctoria.* Grown in pots, &c., as an ornamental plant.—106. Crataeva *religiosa.* Commonly to be found in the neighbourhood of temples.—107. Cactus *ficus indica.*—108. Calyptranthus *caryophyllata.* Native name jamb; the fruit is eaten—109. Capparis *Zeylonica.*—110. Capparis *trifoliad,* or *Crataeva religiosa.*—111. Capparis *sepiaria.*—112. Capparis *acuminata.*—113. Calophyllum *Inophyllum.* A very pretty tree, common in the Concan and Malabar. Oil is expressed from the seeds and used for lamps by the poorer classes of natives.—114. Corchorus *acutangulus.* Annual; common in the rains.—115. Clerodendrum *Siphonanthus.* In gardens only.—116. Clerodendrum *infortunatum.*[†]—117. Clerodendrum *fragrans* in gardens.—118. Cleome *5-phylla.*—119. Cleome *viscosa.*—120. Crotularia *verrucosa.*—121. Clitorea *ternalea.*—122. Citrus *Decumana.* Pummalo or shaddock, commonly cultivated.—123. Citrus *Aurantium.* —124. Citrus *Limetta.*—125. Cacalia *sonchifolia.*[‡]—126. Chrysanthemum *Indicum.*—127. Cadsuarina *muricata.* Common in Bombay, where it is planted for ornament. It shoots up very rapidly.—128. Coix *Lachryma.*—129. Cicca *disticha.* Fruit sometimes used for tarts.—130.

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[*] This fine creeper occurs abundantly on the shore by the race course of Macao in China, occupying the place of the C. *Soldanella* of the Scottish coast.—Edit.

[†] This plant occurs in Dane's I. China.—Edit.

[‡] This plant is also a native of China. I have found it abundantly on a rocky point W. of Dane's Island village, Whampoa, and also on the opposite side of the river Tigris. The correspondence of the Flora of Malabar and China is very striking, but the present catalogue shews that the same observation does not apply to the Concan coast.—Edit.

Cocos *nucifera*.—131. Caryota *urens*. This beautiful palm grows plentifully on the ghauts.—132. Croton *variegatum*. This has obtained the name of laurel, and is very commonly grown in pots. The temporary bungalows on the esplanade are surrounded with it to keep out the glare of the sun. The C. Tiglium grows in Guzurat. I have never seen it.—133. Cynanchum *extensum*. A common twining plant.—134. Cucurbita *Citrullus*.—135. Cucurbita *hispida*.—136. Cucurbita *lagenaria*. The melon and cucumber family are very generally cultivated, and form a common article of food with the natives.—137. Cucumis *sativus*.—138. Cucumis *Colocynthis*. In the Deccan.—139. Cucumis *Melo*.—140. Cucumis *acutangulus*.—141. Cucumis *Citrullus*.—142. Cucumis *Maderaspatanus*.—143. Cylista *scariosa*. Scarce —144. Cannabis *sativa*. An intoxicating liquor called bhang is prepared from it.—145. Cycas *circinalis*.—146. Carica *Papaya*. Generally cultivated.—147. Cassandra *undulæfolia*.—148. Carthamus *tenebrans*.—149. Caesulia *axillaris*.—150. Combretum *decandrum*.—151. Conyza *cinerea*.—152. Cordia *Myxa*. A tree much resembling the alder. Fruit sometimes pickled.—153. Cordia *angustifolia*.—154. Coronilla *grandiflora*. Natives commonly plant this tree about their houses. It has large showy flowers and is of very quick growth.—155. Ceanothus *Zeylonica*. Elephanta.—156. Celtis *orientalis*.—157. Caesalpinia *pulcherrima*.—158. Capparis *aphylla*. Common in the barren lands of Deccan.—159. Careya *arborea*. I have seen only one tree on Malabar hill. 160. Casearia *elliptica*.—161. Chloris *barbata*.—162. Cyperus *rotundus*. —163. Cynosurus *indicus*.—164. Callicarpa *lanata*.—165. Celastrus *montana*.—166. Cynometra *cauliflora*. In gardens scarce.—167. Cookia *punctata*.—168. Cyperus *dubius*.—169. Cyperus *compressus*.—170. Commelina *communis*.—171. Cleome *icosandra*.—172. Cissampelos *convolvulacea*.—*Records of General Science*, July and August 1836.

The President and Council of the Royal College of Surgeons in London, have recently presented to the Madras Medical Society several quarto volumes of an *Illustrated* and *Descriptive Catalogue* of the contents of their noble Museum, which, it is well known, was enriched by the unrivalled collection of the immortal John Hunter.

These volumes in themselves form a most valuable work on Anatomy (human and comparative), Physiology and Pathology, and the cause of those sciences cannot but be advanced by their publication, for which the Council of the College deserves the highest praise. The Engravings are beautiful specimens of art, and highly interesting as illustrative of the most important objects in this magnificent and unique collection.

Cultivators and admirers of Science cannot but esteem it a high privilege to be enabled to contribute to the treasures of the Museum, thereby adding to the splendid fabric raised by the genius of the immortal Hunter; to be associated with whom, in however trifling a degree, in the cause of humanity and science, is an honour and a delight well worthy of the trifling pains and trouble called for on this occasion. As a great number of the medical readers of this Journal boast of the London College as their *Alma Mater*, they possess another motive to induce them to attend to the call made in the following extract from a small volume which accompanied the *Descriptive and Illustrated Catalogue*, in which some admirable directions are given for preserving objects of Natural History; and a list of animals, procurable in the various regions of the globe, is appended, specimens of which are desired to complete the collection—of these we have given here only those found in Asia. The Editor of this Journal will be very happy to receive and forward to the College any contributions that may be sent to him for that purpose.—*Editor Madras Journal.*

3.—Directions *for* Collecting *and* Preserving Animals; *addressed by the* Board *of* Curators *of the* Museum *of the* Royal College *of* Surgeons *in* London *to Professional, Scientific, and other Individuals, with an invitation for Contributions to the Museum of Animal and Vegetable productions, Fossil remains, Anatomical preparations, Casts, Models, Paintings, Drawings, or Engravings, which may conduce to the illustration of the Animal Œconomy in its healthy and morbid conditions.*

Royal College of Surgeons in London. The Council being desirous not only to maintain and preserve the Hunterian Collection, but also by suitable additions to make it as conducive as possible to the illustration of the structure and physiology of organized beings, and to the advancement of Surgery and the Art of Healing generally, solicit contributions to the Museum from Professional, Scientific, and other individuals, of such Preparations, Casts, Models, Paintings, Drawings, Engravings, and Chirurgical Instruments as may promote these objects.

The following Directions, principally drawn up by John Hunter, are proferred to facilitate the endeavours of those friends to Science who may be inclined to further the designs of the Council, and who may not be familiar with the art of preparing and preserving animal substances for anatomical purposes.

Of the methods of catching and preserving animals.—All animals are naturally wild, and in many instances it requires considerable art to catch them. The more perfect animals, which have much progressive motion, require to be taken by means which generally produce some degree of injury to their different parts, and often to their external form; this injury will be in proportion to the difficulty and mode of capture.

Quadrupeds are in general either caught in traps or shot, and consequently some parts of the body are injured; but this is unavoidable. Birds are usually shot, to the injury of their plumage and often of their internal structure.

Snakes, Lizards, and indeed Reptiles in general, are commonly caught without being previously wounded, and therefore suffer less in their external form than birds; but even these may be considerably damaged if care be not taken, for as they are generally caught in the breeding-season, it is very possible that the organs of generation, and the parts contained in them, as eggs, &c., may be crushed; it is therefore proper to seize them by the neck, and immediately to immerse them in spirit, so as to drown them, or to keep them in a bag until spirit* can be procured.

Turtles, Crocodiles, Fishes, Crustaceans, and Insects are liable to little or no injury to their form or structure from the mode of capture.

The softer animals, most of which inhabit the sea, suffer very little from the manner of catching them; but as their shape and size admit of considerable variation, their form may be much altered from the manner in which they die. Animals without internal hard parts to determine their shape or locomotion, yet having a considerable quantity of muscular contraction, vary their shape according to circumstances; of this kind are the Sea Anemones (*Actiniæ*), Priapi or *Holothuriæ*, Shell-fish, Slugs, Medusæ, &c.: these should be allowed to die gradually in the water they are accustomed to; by which means they die in a relaxed state, and display more of their natural external form: but it is desirable to have specimens in the different degrees of expansion or contraction. When dead they are immediately to be put into spirit, for fear of putrefaction, which otherwise rapidly takes place.

A sketch or drawing of Molluscous or other animals of which the form and colour are materially altered by death or when put into spirit, will greatly assist in rendering a description more intelligible. The admeasurements, also, of an animal where parts only are preserved, are very necessary; and the sex should be noted where it is not obvious from the parts preserved.

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* Colourless alcoholic spirit rather above proof is the most fit.

Animals, of whatever class, which are small enough to be preserved whole, should be kept in that state.

Those which are too large to be transmitted entire in spirit, should be divided into such parts as characterize them. When this division into parts is requisite, it will be necessary previously to take notice of all the external appearances, the number of nipples in the female, and their situation, whether between the anterior extremities, as in the Monkey tribe, Bats, Elephant, Dugong, &c.; or all along the belly, as in the Sow, Bitch, Rat, &c.; or between the hind legs, as in the Mare, Cow, &c. If the female cannot be procured, then examine the nipples of the male; and indeed it is proper to examine every male, for it sometimes happens that these parts are concealed, as in the Horse. It is hardly necessary to describe the external parts of the female, as, generally, the whole of them may be preserved.

The situation and external appearances of the penis in its natural state must be observed, whether it extends along the abdomen, as in the Dog; or point backwards, as in the Cat, Rat, Rabbit, &c.; whether covered by the common skin, as in the Bull, Deer, Bear; or by a proper skin, and only attached to the belly at the upper side, as in a Dog, Horse, &c. And any other external appearance which cannot be preserved, or where the parts are too large to be kept whole, should be particularly noticed and described.

When the examination has proceeded thus far, the dissection is to be begun, by opening the abdomen, &c., to see what internal parts are worthy of preservation.

When the animal is opened for this purpose, it will be proper to take a general view of the viscera in their natural situation; to ascertain the number of lobes of the liver, whether there be a gall-bladder, &c., the situation and form of the stomach, spleen, cæcum, kidneys, &c., also to make such observations upon them as may be thought necessary; after which the parts may be separated and severally distinguished by appropriate labels.

Animals whose food is not exactly known should have the contents of the stomach and intestines examined, to ascertain, if possible, what food they had last taken: the kind of fæces contained in the colon and rectum should also be noted.

The stomach and alimentary canal of Fishes, and other marine animals merit particular examination, as frequently containing not only animals and parts of animals which inhabit great depths, and other situations equally beyond the reach of ordinary observation, but also singularly formed intestinal worms.

Memoranda should be made of the localities from which specimens have been obtained; whether at sea or on land; the period of the year when taken, as material to determine the breeding season, &c.; the vernacular names, and the meaning thereof, if any, in the language of the country. If there be no name for a specimen, a number should be attached to it, corresponding with that of the description or memorandum respecting it. A wooden tally or label should be attached to each specimen, where several are put into the same bottle; as tallies of sheet lead, parchment, leather, &c. are liable to be defaced or obliterated.

Such tallies are preferable also for dried specimens, as those written with ink are liable to be defaced by moisture or insects during the voyage.

The bottles being numbered, little trouble will be required to keep an account of their contents, which will add greatly to their value. If this be neglected, much confusion and uncertainty may ensue.

A description should be taken of form, colour, &c. while the animal is alive, or immediately after death, before it be put into spirit; which frequently produces a collapse or contraction of parts, and changes or destroys the colours, particularly those which are delicate or evanescent.

Of Quadrupeds.—The head should be preserved on account of the teeth; but if too large for a cask or bottle, that part in which the teeth are placed may be cut off; but this will seldom be necessary.

The feet and tail may be kept attached to the skin and dried; or if the skin is not preserved, the feet and tail only, either dried or in spirit.

The œsophagus and stomach should be preserved in spirit, with a portion of the duodenum, and the cæcum, if any, with a small portion of the ileum and colon. If the animal be not too large, it will be preferable to cut off from the mesentery the jejunum and ileum, which (after their length and circumference, and the nature of their contents have been ascertained), may be thrown away, and then to strip down from the spine the contents of the abdomen, beginning at the diaphragm, so as to have the liver, stomach, spleen, pancreas, colon, &c., all with their attachments, taken out together as low as the rectum, where it lies in the pelvis, and, after being cleansed and the contents examined, put into spirits.

The heart and lungs may be preserved together, or, if too large, the heart alone with the large blood vessels.

The contents of the pelvis, viz., the bladder and rectum, with the internal parts of generation both male and female; also the external parts not separated from the internal, with a large portion of the surrounding skin, should be left attached in their natural state, and preserved in spirit.

If the female parts are in a state of impregnation, the whole are to be taken out as before described, without opening the uterus unless for the purpose of admitting the spirit for the preservation of its contents, where of large size.

The young of very large animals, as Whales, Seals, the Walrus, Elephants, &c., and all abortions, should be preserved entire: but if a young cetaceous animal be too large, the tail may be cut off below the anus, and the body put into spirit; and if this should be too big for one cask, the head may be taken off and preserved in another.

Of a full-grown whale or other large animal the following parts should be preserved.

The eyes, with the surrounding external skin, their muscles and fat, in an entire mass. The organs of hearing. The brain. Sections of the spinal chord. The supra-renal glands. The ganglions of the sympathetic nerve. The beginning of the aorta and pulmonary artery, for the valves.

The mammæ of the female, with part of the surrounding skin; also the ovaria and uterus. The fœtus, when found in the belly, to be taken out with the whole of the uterus, vagina, ovaria, &c.

The penis of the male taken off as far back as to include the anus with it.

The bones of animals are to be preserved; and, if possible, those of full-grown specimens, both male and female, distinguishing each.

The flesh should be stript off, and the bones either boiled, or put into a cask with water, and securely headed in, if the time and circumstances will not allow of maceration.

To preserve the bones of an animal for a skeleton, it is desirable that as much of the flesh should be removed as possible while quite fresh, without cutting or defacing the surface of the bones; and, if opportunity allows, it is advisable to soak them for several hours in water, frequently changed, to separate the blood; and the brain may be broken down and extracted by means of a small flattened stick, otherwise the skull will be discoloured.

The bones should be allowed to remain connected as much as possible, and, when dried in a tolerably straight position: they may be packed in saw-dust, or shavings of deal, or any other white wood, which will not cause discolouration.

Besides an entire set of bones, it is desirable that a skull or two, shewing the teeth in various stages of growth, be preserved. The teeth to be as perfect as possible, and if any becomes loose or fall out, they may be fixed in their sockets with strong gum-water or glue, but never with paint or putty; or the loose teeth may be tied up in a piece of linen, and securely attached to the skull.

Delicate specimens of skulls, or sets of bones, should be inclosed in small separate boxes, to prevent their being crushed by larger specimens, and many may then be packed in one large case.

All the parts of one Quadruped should be kept together, and separate from those of another.

Of Birds.—Some birds are too large to be preserved entire; therefore it becomes necessary to observe and describe or delineate their external appearances before the parts are separated.

Birds have few internal parts which are necessary to be preserved. The heart and kidneys are nearly the same, I believe, in all birds.

The liver, stomach, intestines, ovary, oviduct, &c., may all be taken out as low as the anus, and preserved in spirit.

The bills and tracheæ, with the lower larynx, should be preserved in spirit by themselves; and when many specimens of a rare or curious bird are procured, the heads of a few of them should be taken off and preserved in spirit.

The legs and feet should be preserved, but they may be dried.

Of Reptiles.—When Alligators, Crocodiles, Turtles, or Tortoises are too large to be preserved whole, some parts, as the head, the whole viscera stripped down from the neck to the anus, and also the anus, should be put into spirit. The bones of such specimens are especially desirable. The eggs at different stages of development should be preserved in spirit, as also the young animals.

Lizards are to be preserved whole.

Snakes may be preserved whole, or in part, especially the heads, both of the poisonous and innocuous species, for the examination of their teeth and fangs.

Of Fishes.—In a fish the external appearances should be attended to, its length, depth and thickness, the number of fins, their shape, where placed, the number of hard and soft rays supporting the fins, &c.

In very large specimens of the Shark or Ray kind, &c., the abdomen should be first opened, then the head taken off by dividing the fish below the heart, across the upper part of the liver, by which means the mouths of the oviducts, if it be a female, the heart, and head are all preserved together.

The tail, if a thick one, as that of a Shark, may be taken off a little below the anus, and the trunk alone preserved for examination. If the trunk be too large, it should be cut through above the pelvis, and the parts contained in the hinder portion, as the claspers of the male, should be preserved in spirit.

If a female, separate the two oviducts through their whole length, where they run along the abdomen, on each side of the spine ; but keep them attached to the pelvis in front, and preserve the whole.

If with young, or eggs, take the whole out in the same way, without opening the oviducts.

The peculiarities of the fœtus in these animals should be attended to.

If not of the Ray or Shark kind, take out such parts from the abdomen as are uncommon or singular.

If fish of the roe-kind, (i. e. Osseous and Cyclo-stomous Fishes), then cut transversely through the fish near the lower part of the roe, some way above the anus. This saves part of the roe, with the connexion between it and the anus, the principal parts concerned in generation.

The tail may be cut off some inches below the anus.

The stomach and intestines may be saved, if any thing particular is observed in them.

Eyes of fishes are proper objects of preservation.

Separate and preserve the heads of such fishes as have any thing singular about the teeth or gills, and are too large to be preserved entire.

If there should be small ones of the same kind, they are to be kept whole ; but still preserve such parts of the large specimens as are curious.

Of Crustaceans and Insects.—Lobsters, Crabs, Beetles, Flies, Butterflies, &c., may be dried, because their external covering is their hardest part, and alters little by shrinking. This is to be done when the external form only is required for examination.

In preparing them for drying, great care is to be taken to preserve all their external parts as perfect and as expressive of the natural progressive action as possible.

Crabs, Lobsters, and Crawfish, when dried, should be wrapt in very soft paper, and then packed in cotton so as not to allow of their being displaced in the case, nor to touch one another.

Insects should be pinned down upon a board or piece of cork, or upon wax which has been melted and poured along the bottom of a flat box : the pin should be greased or oiled, to prevent rust, which would render it difficult to take off the insect. If the pins were pointed at both ends, they would the more readily admit of being turned. The pin must be made so fast in either of these substances as to allow of the motion of the box in all directions, and the fastening must be in proportion to the weight of the animal. To preserve them for anatomical examination they should be put into bottles with spirit.

Lobsters, Crawfish, Crabs, Beetles, may be put into a bottle all together; or if each order be kept separate, yet several specimens may be kept together.

Butterflies, Moths, Bees, should be kept by themselves; for if put into the same bottle with the above, they would be injured.

Of Eggs.—To preserve the eggs of Birds with their nests, each nest should be put into a round box just large enough to contain it. After having made a small perforation at each end of the eggs, and expelled their contents, some cotton should be laid upon them to keep them from being moved about, and the whole covered with the lid.

Large eggs, as those of the Ostritch and Cassowary, at different periods of incubation, should be preserved in spirit.

The eggs of Turtles, Lizards, Crocodiles, Snakes, &c., should be collected, and similarly preserved at different periods after being deposited, until the fœtus be excluded.

A perforation should be made at each end of the egg, by which the spirit will have access to the inside, and the contents be more effectually preserved.

The eggs of all sorts of insects should be preserved in spirit for the same purpose.

Various observations on the means of preserving Animals.

An animal of the firmest kind, in a temperate climate, will generally require a quantity of proof spirit nearly equal to its own weight, to preserve it from putrefaction.

Animals of the mixed kind, neither hard nor soft, such as many of the soft fishes, require rather more spirit than their own weight.

Soft or watery animals, such as many molluscous and other sea animals, require rectified spirit, and nearly the same quantity as the above. But these are relative circumstances, which will vary according to the climate, and the state of the animal at the time. If the climate be very hot, and the animals are to be kept in that climate for some time, or if the parts are not very fresh, more spirit will be required.

This proportion of spirit should be particularly attended to when parts are large; for a very small animal or part will generally have more spirit added to it than what is here directed, while a large animal or part obtains less.

Animals which I call firm are those of the Quadruped kind, as rats, mice, &c.; and indeed snakes, lizards, and all insects (as far as respects the quantity of spirit) may be considered in the same class.

In the mixed kind I would include most sorts of fish; however, there are many fish that may be included with the first.

Of the watery or pulpy kind, I reckon Sepiæ, Medusæ, Echini, Starfish, and likewise all those that appear to be gelatinous, for their internal structure is extremely tender.

If the animal is small, as a rat or mouse, it may be preserved by immersing it in its own weight of spirit; but if some spirit is thrown into the abdomen, so much the better.

If it is a large animal, as a dog,* it ought to have the thorax and abdomen filled with spirit; for before the spirit can penetrate through the cutis, the internal parts will become putrid.

A trochar and syringe will answer for filling both these cavities.

Large fish should be preserved in the same way.

In very soft animals the spirit will generally penetrate sufficiently fast to preserve the whole.

Animals preserved for their external figure should be suspended nearly in the attitudes in which they are designed to be kept.

Animals which are preserved merely for dissection, may be put into a bottle or cask without suspension, and even more than one or two in the same vessel, paying strict attention to the strength and proportion of the spirit.

If two are put into a cask at once, they should be kept apart for some time, as they make too large a mass when close together for the spirit to penetrate.

More than one or two may be put into the same vessel when they are suspended, because then they are not allowed to press on one another.

According to our proportion of animal and spirit, a vessel may be half filled with them.

Birds are seldom so large but that they may be kept in spirit, so as to preserve external appearances; therefore they should all be suspended with some care. Many may be put into one vessel, but must not be squeezed upon one another; and the mouth of the vessel should be wide enough to let them pass both with and against the direction of the feathers.

If the bird was put into a proper position, the feathers made smooth, and rolled up with a fine linen roller, it might still better preserve their external form.

If a pipe was put into the mouth, and spirit thrown down the windpipe, it would pass through almost the whole body by means of the air-cells; and it would therefore be unnecessary to inject any by the anus or abdomen.

Animals of the Lobster or Crab kind may be put into a vessel without suspension, and they should be wrapped up in linen, if preserved in this way, for external form. They should be nearly of the same size, as the larger will break the legs of the smaller if put all together.

Animals of the soft or pulpy kind should be kept apart from others which are hard, more especially if preserved for their external form, and should not be crowded. If possible, they ought to be suspended;

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* I call them large animals, because much larger can seldom be brought home whole.

but many of them are not firm enough to be capable of supporting their own weight upon threads; these should be put into separate bottles.

Shell-fish may be put into the vessels in any manner, as the shell preserves them from pressure; but if they died projecting out of the shell, they should be suspended in the spirit.

If of the spiral kind, a small piece of the shell should be broken off at the tip, to allow the spirit to enter the posterior parts; for the body of the animal fills up the whole mouth of the shell, and the other end becomes putrid before the spirit can get to it.

Snakes should have some spirit injected by the mouth and anus, as I find they are apt to become a little putrid about the belly, and lose the cuticle at that part; then they should be coiled up in close spiral turns round the inside of a small vessel.

Lizards might be suspended by the tails in long bottles.

In some that are very long, the tail may be bent upon the body, or rolled in spiral turns on the inside of the vessel.

The Echinus, with the spines, should be wrapped up in cotton, and either put into a wide-mouthed bottle, or, for greater security, into a round box, with holes in it, so that it can neither touch nor press upon the sides, and the box immersed in spirit.

If the animals are suspended in barrels, cords should be run across the mouth, to which they may be suspended, and then the tops put in, and the spirit added afterwards.

The barrels should in general be tolerably deep.

Of changing the Spirit.—Animals, or parts, that are put into spirit, should have it changed at the expiration of a fortnight; as the first spirit which penetrates the substance of the part to be preserved, will be considerably lowered and discoloured by the fluids of the animal: perhaps it will not be necessary to change the spirit oftener than once; for by the time above mentioned the first spirit will have united sufficiently with the part, and have checked putrefaction, as far as such dilated spirit can, but will not be sufficiently strong to continue the preservation of the part; however, the time will vary according to circumstances. If in a hot climate, the spirit may require changing sooner; if in a cold one, later; if the part be soft or gelatinous, the spirit will also require being changed sooner; and if a hard, or firm part, it may be later.

Another advantage arising from spirit sufficiently strong is its own preservation; for when much diluted and joined with the animal juices, it changes from spirit to vinegar, the effect of which is, that the bones of the animal, or parts, are softened so as to be unfit for a skeleton.

If spirit cannot readily be procured, strong brine will in most cases answer the purpose.

A List of Animals *desirable towards completing the series of* Comparative Anatomy *in the museum of the* Royal College *of* Surgeons *in* London.

The names printed in small capitals are of those Animals which are more especially required.

The names marked with an asterisk (*) indicate those animals of which the bones only need be transmitted. Of these it is highly desirable to procure Skeletons both of the male and female, with separate skulls of both sexes, for the teeth, sexual differences, &c., and skulls of the young animal for the deciduous teeth, and the changes of form resulting from growth.

Skeletons and skulls of the different varieties of the human species are objects of particular interest for the Museum. The names of the Tribes, and the localities to which they belonged, should be transmitted with the specimens.

Asia.—Bombay.—*Monkeys of all kinds.—*Deer.—Maneless Lion. Skeleton and skull of male and female.—*Birds.*—Cambay Flamingo.—Florican Bustard.—*Reptiles, Fishes,* and *Marine Invertebrata* generally.

Ceylon.—*Mammals.* Elephant. Skeleton; skulls of a full-grown male and female. Brain and sections of spinal chord of an adult· Impregnated uterus, and natural skeleton of the young Elephant soon after birth. Mammary gland of a suckling female. Sections of the recent skull, containing the organ of hearing in spirit. Jaws of the young animal, in brine, for the pulps of the growing teeth.—Slow Lemur, especially impregnated uterus.—Slender Lemur.—Musk-deer, or Small Deer, the stomachs distended, in spirit; skeletons and skulls. *Birds.*—Skeletons and Sternums, of all the indegenous Birds.—*Reptiles.* Alligators.—The Snake-lizard.—A large reptile frequenting the great rivers.—The Python, or Boa; the impregnated oviducts.—*Fishes.* All freshwater species.—*Mollusks.* Cuttle-fishes; the Pearl Oyster and the Pearly Nautilus, in spirits. Marine Invertebrata generally. Specimens of the Sea-Mantis (*Squilla*) in spirit, with its ova and young.

Madras and Calcutta.—*Mammals.* Asiatic Lion. Skulls of both exes, and skeleton.—Arctonyx, or Sand Hog.—Pangolin, or Manis; especially impregnated uterus.—One-horned Rhinoceros (same parts as are desirable from the Elephant).—Panda, or Chitwa.—* Chiru Antelope.—Chickara, or 4-horned Antelope,—*The Sloth-Bear.—*Isabella Bear of Nepaul. (The impregnated uterus of any species of Bear is very desirable). Bandicoot Rats.—FLYING SQUIRRELS.—Musk Deer of Thibet. *Squirrels.—Musk-rat, or Musk-shrew. SOUSOUS, or GANGETIC LONG-NOSED PORPESSE, (*Delphinus Gangeticus*). Fossil bones of the *Mastodon*, &c. from the banks of the Irawaddi.—*Birds*. Adjutant. Eggs at different stages of incubation, in spirit. Natural skeletons of young.—Cyrus Crane.—Stanley Crane, or Demoiselle.—Jungle-fowl.—BUSTARDS.—Vultures.—Ducks and Teal. *Reptiles*. Gangetic Crocodile, or GAVIAL. Skeletons of full-sized specimens. Eggs in spirit.—Alligator. Ditto ditto.—Cobra de Capello. Impregnated oviducts in spirit.—*Fishes* and *Mollusks* in general; especially the Cuttle-fishes of all kinds. *Nautili* and *Argonautæ* in spirits.

SUMATRA, JAVA, BORNEO, &c.—ORANG-UTAN. Skulls of this species at different stages of growth, especially the skulls and skeleton of the full-grown or great Orang. Also the viscera of the same; and more particularly the impregnated uterus.—Long-armed Apes, UNGKA APE, &c., the same parts.—INDIAN TAPIR, same parts as from the Elephant.—Civets and Genets.—SUMATRAN RHINOCEROS. Skeletons and skull of both sexes; impregnated uterus. Natural skeleton of the young animal.—*BABYROUSSA.—FLYING SQUIRRELS.—PANDA.—BENTURONG.—MYDAUS or Skunk.—TUPAIA.—GYMNURA, or Rat-tailed Weasel.—DELUNDUNG (*Prionodon*). *Rimaudayan Tiger.—PANGOLIN, or Manis.—TARSIER.—FLYING MACAUCO (*Galeopithecus*).—FLYING FOX (*Pteropus*)—Opossums.—DUGONG. Especially the skulls of an ascertained male and female; impregnated uterus.—*Birds*. CASSOWARY. Skeleton of male and female, natural skeleton of young. Eggs, with embryo, in spirit. Newly hatched young, in spirit.—Horn-bills (*Buceros*); especially the HELMET HORNBILL.—Crown Pigeon.—*TWO-SPURRED PEACOCK.—Java Swallow, and specimens of the edible nests, with the eggs.—*Reptiles*. Alligators, Skeletons of, and eggs.—Pythons, or Boas. Skeletons and impregnated oviducts.—Water-snakes. *Fishes*, especially freshwater species.—*Mollusks* Cuttle-fishes. Pearly Nautilus, in spirit. Paper Nautilus, ditto. The *Teredo giganteus* seu *palmulatus*. Mollucca Crab, in spirit. Marine Invertebrata generally.

4.—*Instructions for Making and Registering Meteorological Observations at various Stations in Southern Africa and other Countries in the South Seas, as also at Sea.*[*]

The great importance of possessing an exact and carefully registered account of the variations of the barometer, thermometer, and other meteorological instruments, and of the winds and weather throughout that extensive region of the Southern Hemisphere, which is either included within the boundaries of this colony, or readily accessible from it, has determined the South African Literary and Philosophical Institution to request the assistance of its correspondents, and of all who may have leisure and inclination for observations of the kind, towards the gradual accumulation of a continued and extensive series of meteorological Journals, and towards carrying into effect a concerted plan of contemporaneous observations, on stated days, from which it is conceived that much advantage will be derived. The institution therefore solicits the attention of its correspondents, and of the lovers of knowledge generally, to this object; and earnestly requests their co-operation in making, arranging, and forwarding to its secretary, resident in Cape Town, observations of the nature; and, so far as practicable, according to the plan of those hereafter detailed. Such observations alone can furnish the materials necessary for an accurate and scientific inquiry into the laws of *climate*, regarded as an object of local interest, and are the only data through which (taken in conjunction with the known laws of physics), the more general relations of meteorology can be successfully investigated.

It can scarcely be necessary to insist on the practical importance of this science to the agriculturist, to the navigator, and indeed in every branch of human affairs, or to dilate on the benefits which must accrue to mankind in general, from any successful attempts to subject to reasonable and well-grounded prediction the irregular and seemingly capricious course of the seasons and the winds; or on the advantages, purely scientific, which must arise from a systematic development of laws exemplified on the great scale in the periodical changes of the atmosphere, depending, as they do, on the agency of all the most influential elements, and embracing in their scope every branch of physical science. It is more to the present purpose to observe that, from what has already been done in this department of human knowledge, there is every reason to hope that no very distant period may put us in possession of the key to many of the most intricate meteorological phenomena, and enable us, though not to predict with certainty the state of the weather at any given time and place, yet at least to form something like a probable conjecture as to what will be the general course of the next ensuing season—perhaps to prepare us beforehand for violent and long-continued gales of wind, great droughts, or extraordinarily wet seasons, &c. in the same manner that our knowledge of the nature and laws of the tides, although confessedly imperfect, and, in a great measure, empirical, yet enables us to announce, beforehand, unusually high or low tides. No doubt such predictions of the weather, although only of a probable nature, would be highly valuable and useful, and would materially influence the practice of men in all operations thereon depending. In illustration of this, we need only refer to the value set by many farmers and others on weather-tables, founded on no sound principles, and ratified at best, if at all, only by a very partial and limited experience; or, to choose a better instance, we may cite the importance which is now attached by every seaman to the indications of the barometer, and the numerous cases with which nautical records abound, of great mischief, or even shipwreck, avoided by timely attention to its warnings.

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[*] These instructions are understood to have been drawn up by Sir JOHN HERSCHEL, for the Meteorological Committee of the South African Literary and Philosophical Institution; and have been very generally re-printed in Scientific Journals in all parts of the world; and their excellence merits the distinction.

In a letter with which we have been favoured from Sir JOHN HERSCHEL, that distinguished philosopher writes: "The hourly meteorological observations at the solstices and equinoxes, of which you have no doubt seen accounts, continue to be made here, and at a very great number of other stations in every quarter of the globe—a series from Madras would be most highly appreciated."

It will be observed that this suggestion has been anticipated; and we hope to have a series of these observations from our excellent and indefatigable Astronomer, for as long a period as may be required.—EDITOR MADRAS JOURNAL.

Meteorology, however, is one of the most complicated of all the physical sciences, and that in which it is necessary to spread our observations over the greatest extent of territory, and the greatest variety of local and geographical position. It is only by accumulating data from the most distant quarters, and by comparing the affections of the atmosphere at the same instant at different points, and at the same point at different moments, that it is possible to arrive at distinct and useful conclusions. Hence arises the necessity of procuring regular series of observations made on a uniform system, and comparable with themselves and with each other, by observers at different stations, and of multiplying the points of observation as much as possible over the interior surface of continents—along sea-coasts—in islands—and in the open ocean.

The geographical position of this colony renders it perhaps the most interesting and important situation on the surface of the globe for observations of this nature: first, whether we regard it either as an advantageous station for observing the commencing action of the great counter-current of the trade-winds, where it first strikes the earth's surface, and, combined with the action of the heated surface of the African Promontory, gives rise to that remarkable alternation of south-east and north-west winds, which forms so distinguishing a feature of our climate—or consider it, secondly, as the farthest extremity of one of the two great *lobes* of land which form the terrestrial part of our globe, and as such, constituting at once a barrier to the currents and tides of two great oceans, and a limit to their climates—or, lastly, as a great nautical station, and one not devoid of difficulty and danger, in which every consideration of practical interest combines to stimulate the curiosity of the theorist, and give importance to the results of his inquiries.

As these pages may fall into the hands of many who have been little in the habit of observing systematically, or who may not be in possession of instruments of the nicest construction, attention to the following instructions is recommended as the means of rendering their observations most available for useful purposes, and comparable with each other, and, with those intended to be referred to as standards.

I. *General Recommendations and Precautions.*

1. The continuity of observations ought to be interrupted as little as possible by changes in the adjustments of instruments—in their places —exposure—mode of fixing—or of reading off and registering them. Whenever any alteration in these or any other particulars takes place, especially such as are likely to affect the zero points, or otherwise to influence the mean results, it should be noticed in the register.

2. So far as possible, registers should be complete—but if by unavoidable circumstances of absence, or from other causes, blanks occur, no attempt to fill them up by general recollection, or by the apparent course of the numbers before and after, should ever be made.

3. The observations should, if possible, all be made by one person—but as this may often be impracticable, the principal observer should take care to instruct one or more of his family how to do it, and should satisfy himself by many trials that they observe alike.

4. The entries in the register should be made at the time of observation, and the numbers entered should be those actually read off on the respective scales of each instrument, on no account applying to them previous to entry *any sort of correction, as for instance for zero, for temperature, capillarity, &c.* All these and the like corrections, being matter of calculation and reasoning from other observations, are to be reserved till the final discussion of the series, and for separate determination and statement.*

5. If copies be taken of the registers, they should be carefully compared with the originals by two persons, one reading aloud from the original and the other attending to the copy, and then exchanging parts, a process always advisable wherever great masses of figures are required to be correctly copied.

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* We regard this as of the highest importance.

6. A copy so verified, or the original, (the latter being preferred) should be transmitted regularly (if possible *monthly* from places within the limits of the colony) to the Secretary of the South African Literary and Philosophical Society, at Cape Town, which institution on its part will take care that such documents shall not merely be treasured as a dead letter in its archives, but shall be rendered available towards the improvement of Meteorological knowledge, to the full extent of their actual scientific value.

7. The register of every instrument should be kept in parts of its own scale, as read off, no reduction of Foreign measures or degrees to British being made—but it should of course be stated *what* scale is used in each instrument.

II. *Of the Times of Observation and Registry.*

Meteorological observations should be made and registered daily, at stated and regular hours. In fixing on these, some sacrifice of system must of necessity be made to the convenience and habits of the observer. The best hours in a scientific point of view would be those of Sun-rise, Noon, Sun-set, and Midnight, and these are the hours for which the registers are kept at the Royal Observatory. But these are not the hours adapted to general habits, and since the midnight observation is likely to be pretty generally neglected elsewhere than in an Astronomical Observatory, the following hours, for a division of the day into three parts, are proposed for what may be deemed the Morning, Afternoon, and Evening observations, viz.

Morning..................	8 A. M.
Afternoon................	2 P. M.
Evening..................	8 P. M.

If, however, the habits or engagements of any one should not allow him to conform to these hours, rather than not observe he may select his own, specifying only what they are at the head of every page of his register, and adhering steadily to them in practice, only observing to make the extreme observations of each day equidistant from the middle one.

At the same time it will be borne in mind, that in what concerns the great Meteorological questions on which the most interesting features of the subject depend, the night is quite as important as the day, and has hitherto been far too much neglected. To any one, therefore, who may feel disposed to enter more zealously into the subject, and will not consider some personal inconvenience ill undergone for the sake of affording data of a peculiarly valuable description, this Committee would most earnestly recommend the adoption, in preference to all others, of the quaternary division of the 24 hours, as followed at the Royal Observatory above alluded to. And they leave it to the consideration of the Council, whether the keeping and transmission of registers on this principle might not advantageously be distinguished by some honorary reward, as that of a Medal for instance, should the funds of the Institution admit of it.

With a view, however, to the better determining the laws of the diurnal changes taking place in the atmosphere, and to the obtaining a knowledge of the correspondence of its movements and affections over great regions of the earth's surface, or even over the whole globe, the Committee have resolved to recommend, that four days in each year should henceforward be especially set apart by Meteorologists in every part of the world, and devoted to a most scrupulous and accurate registry of the state of the Barometer and Thermometer; the direction and force of the Wind; the quantity, character, and distribution of Clouds; and every other particular of weather, throughout the whole twenty-four hours of those days, and the adjoining six hours of the days preceding and following.* The days they have been induced to fix on and recommend for these observations are, the 21st of March, the 21st June, the 21st September, and the 21st December, being those or immediately adjoining to those of the Equinoxes and Solstices, in which the Solar influence is either stationary, or in a state of most rapid variation. *But should any one of those 21st days fall on Sunday, then it will be understood that the observations are to be deferred till the next day, the 22d.* The observation at each station should commence at six o'clock A. M. of the appointed days, and terminate at 6 o'clock P. M. of the days following, according to the usual reckoning of time at the place. During this interval, the Barometer and Thermometer should be read off, and registered hourly, and the precise hour *and minute* of each reading should be especially noted.

For obvious reasons, however, the commencement of every hour should, if practicable, be chosen, and every such series of observations should be accompanied by a notice of the means used to obtain the time, and, when practicable, by some observation of an astronomical nature, by which the time can be independently ascertained within a minute or two.† As there is scarcely any class of observations by which meteorology can be more extensively and essentially promoted, it is hoped that not only at every station of importance in this colony but over the whole world, and on board ships in every part of the ocean, individuals will be found to co-operate in this inquiry. Every communication of such observations addressed by channels as secure and as little expensive as possible to the Secretary of this Institution, will be considered as highly valuable.

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* This is necessary by reason of the want of coincidence of *the day* in different parts of the globe, arising from difference of longitude. In order to obtain a complete correspondence of observation for twenty-four successive hours over the whole globe, it must be taken into account that opposite longitudes differ twelve hours in their reckoning of time. By the arrangement in the text the whole of the *astronomical day* (from noon to noon) is embraced in each series, and no observer is required to watch two nights in succession.

† For example, the first appearances and last disappearances of the Sun's upper and lower border, above and below the sea-horizon, if at sea or on the coast,—or on land the exact length of the shadow of a vertical object of determinate length on an horizontal level, at a precise moment of time, (not too near noon), &c.

III. *Of Meteorological Instruments, and first of the Barometer and its attached Thermometer.*

The Barometer is the most important of all Meteorological instruments. Its office is to measure the actual pressure of the atmosphere on a given horizontal surface at the time and place of observation. Its fluctuations are observed to have considerable relation to changes in the weather, and especially of the wind. Hence its use as a weather-glass.

A Barometer should be examined, before setting it up, for air-bubbles in the tube, and for the existence of air above the mercury in the upper part of the tube. This is done by gently inclining the instrument either way from the horizontal position a little up and down; when air-bubbles, if large, will be seen to run to and fro, and must be evacuated by inverting the instrument and by gentle blows on it with the hand, driving them up into the cistern. If this cannot be done, the instrument is useless. If air exists to an objectionable amount *above* the quicksilver, it will not tap *sharp* against the upper end of the tube when the barometer is quickly inclined from a vertical position, so as to make the mercury rise above its level, nearly to the top, and then gently *jerked* lengthways and backwards. If the blow is puffy and dead, or is not heard at all, the amount of air must be considerable, and may be expelled by inversion.

In fixing the barometer, choose a good light near a window, but not exposed to sunshine, in a retired apartment, little liable to sudden changes of temperature or to drafts of wind. Adjust the tube to a vertical position by a plumb-line, and fix it so as never to shift from that position. Before reading off, give a few taps on the instrument, enough to make the upper end of the column of quicksilver *shake* visibly, as the mercury is apt to adhere to the glass and give erroneous readings. In reading, bring the index always opposite to one part. The correct part to choose is the summit of the convexity of the mercury, to which the index should be made a tangent, but if this be difficult to hit, either from the construction of the index or the want of a proper fall of light, the line of junction of the mercury and glass may be taken. In that case, the tapping should never be omitted. Whichever mode of reading is once adopted should be stated, and always adhered to. A piece of white paper placed behind the upper part of the tube will generally enable any one to read off by the convexity of the quicksilver. In placing the index, notice whether it appears to shift a little up and down as the eye is raised or depressed; this is called Parallax, and is a source of uncertainty to be avoided by placing the eye in reading always on the *exact level* of the top of the mercurial column.

Barometric observations require corrections of three kinds, and to render them available and comparable with others, it is necessary that their amount should be ascertained, and distinctly stated. The first is called the Zero Correction. It includes several subordinate corrections arising from different sources, such as that originating in a faulty placing of the scale of inches, that due to the capillary depression of the Mercury in the glass-tube, and the constant part (which at a fixed station is nearly the whole) of the depression arising from the presence of air or vapour in the upper part of the tube.

To determine the zero correction, the Barometer must be compared with a standard instrument, such as that at the Royal Observatory for instance, or some other which has been compared with it, or with some standard of equal authority. Such comparison ought never to be omitted before forwarding the Barometer to its place of destination, nor should any opportunity be neglected of comparing it, when fixed in its place, with a good portable Barometer. In making such comparisons, all that is necessary is to record the readings of both the instruments, after at least an hour's quiet exposure, side by side, that they may have the same temperature. If compared by two observers, each should read off his own Barometer in his usual manner, and each should take a mean of several readings, then each should verify the other's results. By this means the zero of one standard may be transported over all the world, and that of all others compared with it ascertained.

The amount of the zero correction is often very large, as two or three tenths of an inch, but its influence on the mean results of recorded observations, falls wholly on the determination of the heights of the station of observation above the mean level of the sea, and effects little, if at all, any conclusions of a meteorological nature which may be deduced from them. Hence, if proper care be taken to preserve a Barometer, once set up, immoveable, a long and regular series of observation with it has a value independent of any knowledge of this element, and it is fortunate that this is the case, as the zero correction is one extremely difficult to determine exactly *a priori*.

In transporting a *compared* Barometer to its place of destination, great care is necessary. It should always be carried *upright*, or considerably inclined, and *inverted*, and over all rough roads should be carried in the hand, to break the shocks to which it would otherwise be exposed. If strapped horizontally under the roof of a colonial waggon, or tied upright against the wood-work, with its head resting on the floor, there is not a chance of its escaping destruction. Strapped obliquely across the shoulder of a horseman, however, it travels securely and well, and with common care in this mode of transport, its zero runs no risk of change.

The next correction, and the most important of all, is that due to the temperature of the Mercury in the Barometer tube at the time of observation. To obtain this, every Barometer requires to have attached to, or fixed very near it, a Thermometer, called the attached Thermometer, which must be read and registered at each observation of the Barometer. It is preferable in practice to read off this Thermometer *first*, to avoid the error arising from breathing on, or standing long near it, while reading the Barometer itself. The zero of this Thermometer should be ascertained by comparison with a standard at the temperature of about 60° Fahr.

The third correction applicable to barometric observations arises from change of level of the mercurial surface in the cistern, owing to the transfer of a portion of its contents to or from the tube. In Barometers with small cisterns, and where the lower level cannot be adjusted at each observation, its amount may be large, and its effect being always to make the apparent fluctuation less than the real, *in a fixed proportion*, it ought, if possible, to be ascertained. The data necessary to be known are—first, the internal and external diameters of the tube—secondly, that of the cistern containing the mercury, at the surface, where the tube plunges into it. These particulars, as they must be known to the maker, ought to be inquired of him, and indeed ought to be engraved conspicuously on some part of the instrument.

Although all these corrections are necessary for the strict *reduction* of registered observations, they ought not to be applied to individual observations previous to registry. It is sufficient to know them. Their effect is in all cases easily and safely applicable to mean results, and to the conclusions therefrom deduced, and a world of troublesome and often mistaken calculations may be saved by so applying them.

Of the External Thermometer.—The External Thermometer should have a scale on which whole degrees are read off, and divisions large enough to admit of estimating tenths, or at least quarters of degrees, by the eye. It should be compared with a standard, and the difference stated, at one or more temperatures (the wider asunder the better) within the range of the climate in which it is to be used. In fixing it, choose a perfectly shaded but otherwise free exposure, and one where no *reflected* sunbeams from water, buildings, rocks, or dry soil, can reach it: and easily accessible for reading. There fix it firmly and upright. In reading it, avoid touching, breathing on, or in any way warming it, by near approach of the person. The quicker the reading is done the better.

Although read off at stated times, notice should be taken of all sudden and remarkable changes of temperature, as indicated by the external thermometer, whenever they occur. In the neighbourhood of the Cape, and in many other parts of the continent, hot winds frequently set in with great suddenness, often in the night, and singular alternations of hot and cold temperature occur, disturbing the regular laws of the diurnal fluctuation, and connected, doubtless, with many interesting meteorological phenomena peculiar to the climate of South Africa.

Of the Maximum and Minimum, or Self-registering Thermometer.—This should be placed horizontally in some place out of doors, shaded from direct radiation and rain, and otherwise freely exposed to air, and so fastened as to allow of one end being detached from the fastening and lifted up, so as to let the indexes within the boxes slide down to the ends of the fluid columns, a more convenient mode, when the steel index is free enough to allow it, than the use of a magnet.

Both the thermometers should be read off as early as possible every morning, and the indexes re-adjusted. But as double maxima frequently, and occasionally double minima occur, in consequence of sudden changes of temperature, it is recommended occasionally to inspect both of them, with a view to ascertain whether the motion of either the mercury or spirit has been reversed in an unusual manner, and such double maxima or minima, when remarkable, should be recorded as "supernumerary," with their dates and leading features.*

The Self-registering Thermometer is extremely apt to get out of order, by the indexes becoming entangled in the column of fluid. In travelling they should not for a moment be carried with the mercury bulb downwards; if this should happen, they are *sure* to arrive in a state unfit for use. To correct them is tedious, and always hazards fracture. With great care, however, it may be done, as follows:—

1*st*, The Spirit Thermometer. By many jerks, force the index down to the junction of the bulb and tube; then, by cautiously heating and cooling alternately the bulb, the tube, or the air vessel at the top, as the case may require, the disunited parts of the spirit may be *distilled* from place to place, till the whole is collected in one column in union with the spirit in the bulb.

2*d*, The Mercurial Thermometer. When the steel index gets immersed in the mercury, it cannot be moved by a magnet, and lets the mercury pass by its side. First cool the bulb (by evaporation of either, if necessary) till the mercury is either fairly drawn down below the index, or a separation takes place in the column, leaving the index with mercury above it. Endeavour then, by tapping, warming the tube, or by the magnet, to loosen the index ever so little, then apply heat to the bulb, and drive up the index with its superabundant mercury quite into the air-vessel. This requires many trials and much patience. When there, hold the instrument bulb downwards, and suspend the index by a magnet at the top, allowing any globule of mercury to drop into the origin of the tube below; then heat the bulb cautiously over a very small clear flame of an oil lamp, till the mercury rises to the very top of the tube, and fairly unites with the globule there awaiting it. Let the bulb cool, and the mercury will sink in one united column; if not, heat it again. When this is accomplished, the index may be set loose, by withdrawing the magnet, and restored to its proper position in the tube.

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* The spirit thermometer is apt to undergo a gradual change of zero by the transfer (by distillation) of part of its spirit to the upper end of the tube. It should, therefore, often be compared with the mercurial one, and the difference of readings applied as a zero. In this *only* case is the application of a zero *before* registering permissible, and indeed essential.

A self-registering thermometer may be advantageously left (properly secured) for a whole year, or parts of a year, on elevated summits or rather remarkable points, to ascertain their maxima and minima of temperature during absence. In such cases, take care to defend them from discovery, or accident from wild animals, birds, snakes, &c. In taking it up for reading off, observe not to derange the indexes, and do not leave it without seeing that the indexes are in contact, and the temperature that of the air at the moment.

Of Thermometers buried in the Earth.—Thermometers buried at different depths, for the purpose of examining the monthly changes of temperature of the soil, should have their balls and lower part of the scale well wrapped up in woollen cloth or pounded charcoal, and should be placed in strong earthern vessels, which may be entirely withdrawn from the ground so as to allow of inspecting and reading off the scale, without exposing the balls to any possibility of changing their temperatures while under examination. The vessels should be fitted with covers, to defend the scale from injury in burying and digging up.

A pipe of earthenware (composed of separate pieces), or one of wood, may be sunk ten or fifteen feet below the surface, into dry earth, and a thermometer, defended as above, lowered *by a chain.* The pipe being then obstructed at every two feet by some stuffing readily hooked up, the thermometer may be easily examined, and a register of its indications kept with very little trouble. In like manner, the temperature of wells may be registered.

Of the Temperature of the Sea.—The surface temperature of the water at sea should be registered, as a matter of course, with the same regularity and at the same hours as the barometer and thermometer. It is more conveniently (and with quite accuracy enough for the purpose) obtained by taking up a bucket-full of the water and stirring round the thermometer in it. Whenever a change to the extent of 2° Fahr. appears to have taken place since the last observation, a fresh bucketfull should be taken up and the observation repeated. It should also be noticed whether rain has fallen since the last observation. A sudden depression of 3° or 4° indicates the near approach of land. In a voyage from England, lately made by a member of this committee, the temperature of the surface water fell at once 9° Fahr. on approaching within a few miles of the entrance of Table Bay.

The temperature of the sea at considerable depths can hardly be regarded as a subject of ordinary meteorological inquiry and regular registry, though undoubtedly one of much physical interest, for which reason it is not considered necessary to dwell further on it.

Of the Hygrometer, &c.—In the absence of Daniell's Hygrometer, or of ether to cool it, the degree of dryness of the air may be ascertained by observing the temperatures marked by two thermometers suspended freely side by side (but not in contact) in the shade, and completely defended from all radiation *to* or *from* the *sky*, the one having its bulb and stem naked, the other with the bulb and lower part of the stem wrapped in linen or cotton, and thoroughly wetted with pure spring or rain water. The temperatures indicated by both should be noted when the wetted thermometer refuses to sink lower, and the conclusions left for subsequent calculations. The naked thermometer may be the "External Thermometer" itself, in which case a coated thermometer may be kept always suspended near it, completely screened as above mentioned, and wetted some minutes previous to the regular daily readings.

If a hair hygrometer be used, its points of absolute moisture and dryness should be frequently ascertained, as they are apt to change. The former may be found by keeping it some time in a close covered jar lined with wet blotting paper, and having water in it, and noting the point of moisture beyond which it refuses to go. The latter, by keeping it in the same manner in a jar perfectly air-tight, over fresh burnt quicklime, till it refuses to indicate a higher degree of dryness.

The best measure of the *momentary evaporating power* of the air, seems to be the depression of the wetted thermometer below the dry one. But the *actual evaporation* from a given surface, is quite another thing, and a question may very reasonably be raised, how far any useful approximation to a knowledge of the total evaporation from an extensive and diversified surface, unequally moistened, and variously exposed to the sun, defended by clouds, or refreshed by dews, *can* be obtained by any small or local experiments.

The Rain-gauge is an instrument of such extremely easy construction that any person who lives near a tin-man can procure one. In a climate so arid as that of Africa, however, it must be remembered that it will often need examination and cleansing, owing to long intervals of disuse in which insects and dust may lodge. It will often happen, too, that the slight rain of one day, if left unregistered, will be entirely lost by evaporation in the next—nay, that slight and transient showers may never enter it, being evaporated from it as they fall. The effect of copious dew, too, must be separated from that of rain, so that the mere registry of the contents of the gauge is not of itself a sufficient indication whether rain has fallen in the night or not. However, there are usually good reasons for decision on this point from other indications. Attention to the amount of dew is very necessary, not only because the meteorological questions involved are of a high degree of interest generally, but because in arid climates the dews are of almost as much importance to the maintenance of vegetation as the rain.

In stating the quantity of rain daily received in the gauge, the height of the receiver above the soil should be mentioned, experience having shown that the quantities of rain which actually fall on a given area on the ground, and at a very moderate height above it, often differ materially. In some localities and circumstances, the rain-drops receive accession from the air as they descend, in others they undergo partial evaporation. The former is generally the case in cool moist climates—the latter may be expected in this country.

Of the Wind.—The points most important to remark respecting the wind, are,

1st, Its average intensity and general direction during the several portions of the day devoted to observation and registry.

2dly, The hours of the day or night when it commences to blow from a calm, or subsides into one from a breeze.

3dly, The hours at which any remarkable changes of its direction take place.

4thly, The course which it takes in veering, and the quarter in which it ultimately settles.

5thly, The usual course of *periodical winds,* or such as remarkably prevail during certain seasons, with the law of their diurnal progress both as to direction and intensity—at what hours and by what degrees they commence, attain their maximum, and subside, and through what points of the compass they run in so doing.

6thly, The existence of Crossing Currents at different heights in the atmosphere, as indicated by the course of the clouds in different strata. In observing these, it is advisable to fix the eye by some immoveable object, as some point of a tree or building, the sun, or the moon, otherwise mistakes are apt to arise.

7thly, The times of setting-in of remarkably hot or cold winds,—the quarters from which they come, and their courses, as connected with the progressive changes in their temperature.

8thly, The connexion of rainy, cloudy, or fair weather, with the quarter from which the wind blows or has blown, for some time previous.

9thly, The usual character of the winds as to moisture or dryness, not as deduced from mere opinion or vague estimation, but from actual observation of the hygrometric state of the atmosphere during their prevalence.

Among these particulars it will be seen that some are of a nature susceptible of daily observation and registry, while others call for an exercise of the combining and inductive faculty on the observer's part, and cannot be made out otherwise than by continued attention and habitual notice of phenomena with a view to the investigation of their laws. The general impression left upon the mind as to any of the points of this kind above enumerated, by the occurrences of the past month, will therefore be more properly stated, in the way of summary remarks at the end of the Monthly Registers, than as entries under particular days.

Of the State of the Sky.—In describing the state of the sky as to clouds, &c. the observer will bear in mind that it is only in that region of the sky which is vertically above him that the true forms and outlines of the clouds are exhibited, and the area they cover, as well as the intervals between them distinctly seen. As they approach the horizon in any direction, their extent is foreshortened by perspective, their apparent magnitude diminished by distance, and their intervals covered in and hidden by their mutual interposition. In estimating therefore the quantity of clouds in the sky, regard must be had to this, and our judgment should rather be formed on a view of the region extending from the zenith every way half way down to the horizon, that from the aspect of the heavens below that limit. It would be better to notice both, and state, separately, the proportions in which each are covered, and the quarter of the horizon towards which the chief masses in the lower region lie.

The general aspect of Clouds, as classed under the heads Cumulus, Cirrus, Stratus, &c. should be noticed, and especially the height of this inferior surface, or the level of the *vapour plane*, should be estimated. In a mountainous region this is easy, so long as the vapour plane is below or not far above the summits of the hills, and in such regions the formation and dissipation of cloud in the neighbourhood of the mountain summits, under the influence of certain winds, form a subject of study of a highly curious and interesting nature.

The formation of Clouds at night, during calm weather, under the influence of a gradually descending temperature, is another point worthy of attention. It frequently happens, that, without any perceptible wind, the sky will suddenly become hazy in some one point, and the haze condensing and spreading, in all directions, without a wind, the whole heaven will become overcast in a remarkably short time. The same thing will sometimes occur nearly at the same hour for many nights in succession. Such phenomena should be noted whenever they occur.

Two or even three strata of clouds are very common in this district of South Africa. The lowest frequently resting immediately on the land and sea. The height and thickness of these strata, their connexion with cross or opposite currents of wind in the regions where they subsist, and the laws of their formation in gradual intermixture, deserve to be studied with care, and with reference to the hygrometic state of the air at the time and place, and for several hours before and after.

Of Thunder and Lightning, and of the Electricalstate of the Air.— Connected with this part of the subject is the observation of shooting Stars and luminous Meteors. Remarkable ones should be noticed, and the moment of their appearance, their direction, duration, length of path, and *course among the Stars*, ascertained and noted, with the phenomena of their increase and decay of light, apparent size, separation into parts, trains left behind, &c. The *general* direction (if any) which they observe on particular nights, is a point also to be attended to. Such are the frequency and brilliancy of these splendid phenomena in the clear sky of this colony, that there can be no doubt of their affording an available method of ascertaining the differences of longitude of the most distant stations, if duly observed by persons furnished with means of ascertaining the time.

Thunder-storms of course will be noticed when they occur under the general head of the weather, but it is of consequence also to notice distant lightning, not accompanied with thunder audible at the place of observation (by reason of its great distance),* especially if it takes place many days in succession, and to note the quarter of the horizon where it appears, and the extent it embraces. In an actual thunder-storm, especial notice should be taken of the quantity of rain that falls, and of the fits or intermittances of its fall, as corresponding, or not, to great bursts of lightning, as also of the direction of the wind and the apparent progress of the storm with or against it.

Observations of the Electrical state of the Air in serene weather are unfortunately too much neglected. The apparatus they require is simple, and by no means costly, and may be constructed indeed by any one for himself with ease.

If the Committee in this their first Report do not dilate on this and other of the less usually practised observations of Meteorology, it is because they wish for the present chiefly to call attention to the accumulation of regular and daily observations of a more definite and numerical character. With this view they have drawn up, and by the liberal aid of Government, have procured to be printed skeleton forms, for immediate distribution among such Correspondents of the Institution, and others, as may be willing to undertake their filling up. These comprise, it is true, only the registers of the Barometer and its attached Thermometer, with that of the external Thermometer, and a column of Remarks for Wind and Weather, as being the most essential and indispensable elements of Meteorology; but it is in the power of any one who pleases to supply additional information, and to those who have leisure, instruments, and inclination for the task, the Committee would particularly recommend the regular observation of the Wet Thermometer, those of the Self-registering Thermometer and Weekly or Monthly Observations of Thermometers buried at different and progressive depths beneath the surface of the soil.

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* Thunder can scarcely ever be heard more than 20 or 30 miles from the flash which produces it. Lightning, on the other hand, may be seen (or at least its reflexion on the clouds, forming what is called *sheet lightning*) at the distance of 150 or 200 miles.

The printed forms provide for the arithmetical convenience of casting up the *means* for each month. In doing so, it is requested that care will be taken to verify the results by repetition, and (that usual sources of error may not escape notice) they recommend in every instance, before adding up the columns, to look down each to see that no obvious error of entry (as of an inch in the barometer, a very common error, or what is more difficult of detection, an error in the first decimal place) shall remain to vitiate the mean result. It is perhaps unnecessary to do more than mention the precaution of *counting* the days in *each* column on which observations occur, so as to admit of no mistake in the *divisor*, and to use throughout the decimal arithmetic in calculating the mean results. Care and exactness in these points will in most cases add greatly to the value of the communications, as it well be quite impracticable for the Committee, should observations flow in in masses, unreduced or erroneously reduced, to undertake the overwhelming task of recomputing them.

Although not, strictly speaking, a branch of meteorology, yet as the collection of observations of the Tides has been made a part of the duties of your Committee, they propose the following stations as points where it would be especially desirable to obtain regular observations of the time and height of high and low water, according to the rules and on the plan proposed by Mr. Whewell, in his late researches on this subject, and they earnestly invite communications on this head from any residents at those ports who may have leisure and take interest enough in the important questions connected with the subject.

Cape Town,
Simon's Bay,
Port Elizabeth,
Knysna,
Saldanha Bay,
Ascension,
Mauritius,
Tristan d'Acunha,
Madagascar,
Mozambique.

In Cape Town and Simon's Bay, they have the pleasure to report, that a series of observations under the superintendence of Captain Bance and Mr. Levien have already been undertaken at the instance of the Astronomer-Royal, and are now in active progress.

XIV.—*Meteorological Observations registered at the Madras Observatory during the Storm which occurred on the 30th of October* 1836.

1836	Time.	Barometer.	Correction.	Barometer reduced.	Wind.	Weather, &c.
Oct.		Inch.		Inch.		
29	10 A. M.	30,050	0,000	30,050	N.	
	Noon	30,050	....	....	N.	
	2 P. M.	29,970	....	....		
	6 „	,940	....	....	N.	
	8 „	,956	....	....		
	10 „	,950	....	....		
30	6 A. M.	,940	....	....	N.	Brisk breeze.
	7 „	,880	....	....	N.	Do. do.
	7.30 „	,864	....	....	N. N. W.	Strong wind at intervals
	8 „	,852	....	....	N. W. by N.	Do. do. rain.
	9 „	,850	....	....	N. by W.	Do. do. heavy rain.
	10 „	,795	....	....	N. by W.	Do. do. rain.
	11 „	,750	....	....	N.	Do. do. do.
	Noon	,707	....	....	N. N. W.	Approaching to a gale.
	1 P. M.	,586	....	....	N. by W.	Brisk gale—rain.
	2 „	,560	,239	29,321	N.	do. do.
	3 „	,510	,241	,269	N.	At times a violent gale.
	4 „	,360	,249	,111	N.	Very violent gale—rain
	5 „	29,150	,259	28,891	N.	Approaching to a hurricane.
	6 „	28,980	—	—	N.	Do. do.
	7 „	,915	—	—	N.	Up to ¼ before 7 the wind continued to blow a perfect hurricane ; from this time up to 7 o'clock it gradually abated, and from 7 till ¼ before 8 a perfect calm ensued ; from ¼ before 8 the wind began to blow from the south, moderately at first, but increasing in strength every moment.
	8 „	28,915	—	—	S.	Blowing a perfect hurricane.
	9 „	29,280	,253	29,027	S.	A violent gale.
	10 „	,500	,242	,258	S.	Do.
	11 „	,650	,235	,415	S.	A strong wind.

The barometer employed in the observations of the 29th, and up to 1 P. M. of the 30th, was the standard barometer which has hitherto been in use. At 2 P. M. the northern doors of the Observatory were burst in, and the moveable roof blown open, whereby the standard barometer and thermometer, at one rude rush of the wind, were, with telescopes, tables and chairs, overturned and broken. I was consequently under the necessity of registering the first barometer which came to hand (one by *Harris*), whose indications are given above for 2 P. M. *et seq.* To discover the error of this barometer, and to replace as well as I could the standard which had been broken, I availed myself of the old frames of the two standard barometers just alluded to (which had not been damaged), and filled two tubes which are now in use. In the first place it was desirable to examine the scales; this I was enabled to do very satisfactorily, by means of a standard two feet scale by *Adams* with the assistance of a pair of beam compasses. The divisions on one of the frames (*Dollond's*) agreed perfectly with the standard scale; but the other frame (*Gilbert's*) was in error ,025. In the next place the purity of the quicksilver was to be ascertained—having failed for several days to meet with any means of distilling quicksilver or any one who could assist me in this respect, I had recourse to washing it repeatedly in diluted nitric acid, which combining with the bismuth or antimony with which quicksilver is generally adulterated, leaves the quicksilver quite pure. I have not yet determined its specific gravity to any great degree of accuracy, for want of proper means; but from two separate experiments agreeing very well with one another, it came out 13,645; shewing that a correction 0,033 subtractive should be applied to the readings, to obtain those which should obtain were the quicksilver of standard purity. Doubtful if this or any correction was necessary, from the apparent purity of the quicksilver; I procured some very bad bazar quicksilver, and washed it with nitric acid in the same way as practised before on quicksilver, procured from the Medical stores; when the same tube, successively filled with the two sorts of quicksilver, did not differ ,010, of an inch in its indications. The quicksilver was not boiled in the tube, by reason of the danger attendant upon such an experiment; but both the tube and quicksilver were heated before being used, to a temperature of about 180 degrees. To be sure that no air or moisture existed in the tube or quicksilver, I have refilled one of the tubes three successive times, and found a difference in the third decimal place only. The particulars of these barometers are as follows:

	Dollond's scale.	*Gilbert's scale.*
Correction of the divisions........	Inches 0,000	Inches —0,025
Diameter of bore of the tube......	„ 0,19	„ 0,28
Correction due to capilliary action.	„ +0,061	„ +0,031
Relative indications..............	„ 29,958	„ 30,020

Applying the corrections due to error of division and capilliary action, the relative indications are as follows :

Dollond	30,019
Gilbert	30,026
Differing	,007

For the present I propose to consider the barometer named *Gilbert* as a standard, liable only to some very small correction for the specific gravity of the quicksilver. On comparing this barometer with that by *Harris*, (which, as I have already stated, was employed at and after 2 P.M. on the 30th); when the latter stood at 30,200, it required a correction —0,207 inches, and, on account of the large bore of the tube, and a small cistern, it should be further diminished by one-twentieth of its indications below that state. This at least is true for the indications at and near 30 inches : for indications near to and below 29 inches, however, (by reason of a sudden contraction in the cistern, whose relative capacity to that of the tube I have no means of determining without destroying the barometer) a much larger amount of correction becomes necessary. Hence, the corrections due to the indications at 6, 7 and 8 o'clock are necessarily involved in doubt, and, since any attempt to estimate their value can be but little better than a guess, I have preferred omitting them altogether. To render the observations complete, however, I here subjoin a registry which was made at an adjoining house ; having first compared the barometer with, and reduced its indications to, my present standard.

Barometrical Observations reduced to the *Gilbert* standard :

	h. m.	
1836, October 30th at	6.0	28,625 inches.
	6.55	,285 „
	7.45	,285 „
	8.30	,725 „

The above barometrical indications, as well as those which precede them, are corrected for capilliary action, and are consequently those which belong to an elevation of 27 feet above the level of the sea, and to the various temperatures under which they were taken.

The thermometrical indications are read off from a thermometer by *Bate*, which was sent out to me from England a short time before the storm ; its indications corresponded exactly with *Troughton's* standard at the temperature of 75°, but I had no opportunity of verifying it on he other divisions.

Madras Observatory.

	h.	*m.*	*s.*
Longitude..	5	21	7.7 E.
Latitude....	13	4	8.5 N.

T. G. TAYLOR,
H. C.'s Astronomer.

HORARY OBSERVATIONS MADE AT THE MADRAS OBSERVATORY, ON DECEMBER 20, 22, 1836.

1836.	Time.	Barometer.	Ther.	Wind.	Remarks.
Dec. 20	6 P. M.	29.942	74.3	N. E.	F. C. gentle breeze.
	7 „	29.948	73.1	do.	do.
	8 „	29.968	71.8	do.	do.
	9 „	29.986	71.5	do.	do.
	10 „	29.990	70.1	Calm.	Clear
	11 „	29.980	70.1	do.	F. C.
	12 „	29.972	70.0	do.	do.
21	1 A. M.	29.972	69.8	do.	Clear
	2 „	29.954	68.7	do.	do.
	3 „	29.934	67.4	do.	do.
	4 „	29.952	66.8	do.	do.
	5 „	29.958	66.2	N. E.	do. gentle breeze.
	6 „	29.962	66.0	do.	do. do.
	7 „	29.978	67.7	N by E.	do. do.
	8 „	30.000	70.5	do.	do. do.
	9 „	30.020	73.7	do.	do. do.
	10 „	30.022	76.2	N.	do. do.
	11 „	30.014	78.0	N.	F. C. do.
	12 „	29.986	77.8	N.	do. moderate breeze.
	1 P. M.	29.962	77.9	N. E.	do. do.
	2 „	29.930	79.2	do.	do. do.
	3 „	29.932	78.2	do.	Clear do.
	4 „	29.933	78.1	do.	do. do.
	5 „	29.940	76.0	do.	do. do.
	6 „	29.932	74.2	do.	do. do.
	7 „	29.952	73.8	Calm.	do.
	8 „	29.960	72.1	do.	F. C.
	9 „	29.990	72.3	N.	do.
	10 „	29.990	71.8	Calm.	Clear
	11 „	29.978	71.5	do.	F. C.
	12 „	29.976	70.9	do.	do.
	1 A. M.	29.950	70.0	do.	Clear
	2 „	29.944	68.8	do.	do.
	3 „	29.922	68.6	do.	do.
	4 „	29.916	68.0	do. E	do.
	5 „	29.924	67.8	do.	do.
	6 „	29.942	68.0	do.	Hazy
	7 „	29.964	68.4	do.	Th. do.
	8 „	29.986	70.3	do.	do. do. gentle breeze.
	9 „	29.998	73.9	N. by W.	do. do. F. C. do.
	10 „	30.000	74.3	do.	Cloudy do.
	11 „	29.996	77.8	N.	F. C. do.
	12 „	29.986	78.8	N.	Cloudy do.
22	1 P. M.	29.970	79.1	N. E.	do. do.
	2 „	29.950	80.2	do.	do. do.
	3 „	29.950	80.0	do.	Moderate breeze.
	4 „	29.950	78.5	do.	Cloudy do.
	5 „	29.942	76.1	N.	Flying clouds.
	6 „	29.944	75.6	N. E.	Haze.

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF OCTOBER, 1836.

Days.	BAROMETER AT							THERMOMETER AT							RAIN.		Evaporation.	DIRECTION OF WIND.			REMARKS.		
	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.		Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1836	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	0	0	0	0	0	0		In.	In.	In.						
Oct. 1	29,901	29,970	29,956	29,894	29,896	29,960	29,980	74,0	85,4	88,0	86,0	85,8	84,0	83,7				S W	S W	S E	Clear	F. Cs.	Cr. light.
2	,980	—	30,006	,970	,960	,990	,996	77,0	—	87,6	86,5	86,0	83,8	80,9				S W	E	S E	do	do	Cloudy
3	30,004	30,042	,020	,960	,950	,980	,988	7 ,2	85,8	87,8	88,8	85,6	82,0	79,7				W	S E	S	do	do	Clear
4	,000	,050	,032	,982	,97	30,025	—	74,7	86,3	88,0	87,0	85,1	84,2	—				S E	S	S	do	do	Cloudy
5	,040	,086	,052	30,010	30,008	,040	30,044	77,9	85,6	87,5	85,4	83,2	83,5	83,0			2,096	N	S E	E by S	Cloudy	Clear	do
6	,054	,094	,085	,046	,04	,076	,092	72,0	84,4	86,8	88,0	85,0	83,0	83,0				W	E	E	Clear	F. Cs.	Clear
7	,100	,136	,126	,100	,088	,090	,102	70,7	84,5	86,1	87,0	84,2	80,2	77,5				N W	E	S E	do	Clear	do
8	,090	,108	,100	,056	,040	,050	,064	67,8	82,9	85,9	88,4	85,1	81,3	80,6				W	W	S	do	do	do
9	,064	,104	,06	,038	,020	,062	,07	72,3	84,9	88,2	88,2	86,5	82,0	81,5				S W	N	S E	Cloudy	do	do
10	,074	—	,08	,076	,060	,078	,088	70,9	—	89,5	88,0	85,8	84,1	81,4				S	E	S	F. Cds.	F. Cs.	do
11	,082	30,112	,100	,068	,068	,084	,090	70,0	85,2	87,3	88,2	84,9	83,8	83,5				W	E	S	do	Clear	do
12	,090	,114	,102	,080	,058	,082	,092	71,9	84,1	86,0	87,6	84,0	83,2	82,3			2,320	W by S W	S E	S	Clear	F. Cs.	do
13	,088	,126	,110	,086	,078	,096	,104	72,0	84,5	86,3	87,4	84,5	83,4	82,8				W	S E	S S E	do	Clear	do
14	,108	,136	,122	,088	,073	,096	,106	74,1	84,2	87,2	87,5	85,0	84,2	82,5				S W	S E	E	F. Cds.	do	F.C.light.
15	,100	,136	,120	,100	,074	,098	—	73,4	86,4	87,5	88,3	85,4	83,5	—				N W	S E	N E	do	do	F. C.
16	,094	—	,108	,082	,070	,088	30,096	72,8	—	86,0	86,	84,8	83,7	82,9				N	E	E	Clear	do	Clear
17	,084	30,122	,110	,088	,074	,090	,100	71,0	85,0	86,0	87,0	84,3	80,9	79,0				W	S E	E	Haze	do	do
18	,104	,132	,106	,086	,070	,0 2	,092	72,0	84,2	86,0	87,0	83,8	82,4	82,4				W	S E	S E E	F. Cds.	do	do
19	,106	,130	,112	,082	,080	,096	,112	70,1	84,4	86,5	87,6	82,9	81,9	81,7			2,444	N W	E	N E	Clear	do	do
20	,100	,156	,128	,094	,090	,122	,130	68,0	84,2	85,5	86,0	82,5	81,8	81,0				N E by N	E	N E	do	do	F. Cs.
21	,112	,152	,128	,105	,088	,116	,126	67,9	84,1	84,8	85,0	82,2	81,6	80,0				N W	E	N E	F. Cds.	do	F.C.light.
22	,108	,156	,142	,092	,080	,106	,110	69,9	83,9	85,4	85,	81,7	80,2	79,0				N	N E	N E	do	do	Clear
23	,098	,114	,088	,068	,070	,093	—	74,2	84,2	84,2	85,8	82,3	82,2	—				N.E	N E	N E	do	Th. haze	F.C.light.
24	,090	,106	,102	,078	,064	,084	—	72,0	84,0	86,0	84,8	82,0	81,7	—				N	N E	N E	Th. haze	do	Haze
25	,081	—	,090	,074	,070	,080	30,096	79,0	—	85,2	86,0	82,2	81,8	81,3				E by N E	N E	E by E	F. Cds.	F. Cs.	F.C.light.
26	,082	30,105	,088	,066	,056	,070	—	78,0	81,2	85,9	84,3	82,3	81,4	—			2,896	N E	E	N E	Th. haze	Th. haze	Cy.thr.lt.
27	,084	,088	,078	,058	,050	,060	—	73,3	81,5	82,7	84,5	80,8	80,0	—	0,667			W	N E	N E	Cloudy	Cloudy	Haze
28	,060	,080	,064	,018	,050	,054	—	73,7	82,0	84,0	85,0	81,5	80,1	—				N E	N E	N E	do	F. C.	do
29	,050	,050	,050	29,970	,040	29,956	29,950	73,8	84,3	85,0	84,5	74,6	80,6	—				N	N	N	Th. haze	Cloudy	Cy.thr.lt.
30	29,940	29,795	29,704	,321	28,713	28,644	,258	73,5	75,8	76,0	76,0	—	—	—	0,340			N	N	N and S	Cloudy	Rain	Vlt.storm
31	—	,640	,628	,618	29,620	29,690	—	—	78,4	82,0	82,0	79,9	79,8	—	7,500			—	S	S	do	Cloudy	do
Mean	30,066	30,076	30,058	30,015	29,99	30,008	30,039	72,7	83,9	85,8	86,1	83,5	82,2	81,4	—	—	—						

Days.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.	Evaporatio	Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1836	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	°	°	°	°	°	°	°	In.	In.	In.						
Nov. 1	29,689	29,750	29,742	29,695	29,689	29,720	29,740	72,9	80,3	82,4	82,3	79,9	79,7	79,6				s by w	s	s	Haze	F. Cs.	Th.haze.lt
2	,710	,750	,740	,680	,650	,700	—	73,1	82,0	82,0	81,2	80,2	79,9	—				s	s	s	Th.haze	Cloudy	Cloudy lt.
3	,700	,730	,740	,690	,689	,730	—	75,9	82,1	83,5	80,4	79,9	79,9	—				s	s w	s	Cloudy	do	F Cs.th.lt.
4	,778	,830	,820	,785	,760	,809	,830	73,7	78,8	80,4	82,0	81,3	80,1	80,0				w	N E	E	do	do	Cleardodo
5	,800	,850	,865	,815	,809	,840	,880	73,9	80,4	82,0	82,0	81,7	81,1	80,4		2,500		N by NW	s E	s E	F, C.	F. Cs.	FCs.do do
6	,840	,897	,880	,830	,819	,858	,862	73,8	81,0	81,0	82,0	82,0	81,5	80,9				N W W	E	N E	do	do	Clear do
7	,839	,880	,879	,840	,820	,860	,900	74,7	81,7	82,4	82,0	81,3	80,4	80,4				N W	E	N E	do	do	do. th.do
8	,880	,929	,940	,900	,860	,910	,930	74,2	76,3	79,0	80,5	80,9	80,5	80,0				N	N	N E	Cloudy	Cloudy	F Cs. do
9	,900	,930	,950	,910	,890	,900	,930	73,1	79,8	80,4	81,4	80,8	80,2	80,0				N	E	N E	F. C.	F Cs.	F Cs.
10	,890	,909	,910	,880	,890	,900	,908	73,0	80,0	81,0	81,5	80,9	78,5	77,6				N	N W	N E	Clear	Clear	Clear dew
11	,880	,900	,906	,856	,849	,850	,858	70,2	79,5	80,7	81,2	80,0	76,9	75,7				N E	N E	N E	do	do	do do
12	,849	,880	,890	,850	,830	,850	,870	69,1	77,9	80,6	80,7	79,8	78,3	78,0				W	N E	s E	Haze	do	do do
13	,866	,895	,900	—	,860	,920	—	71,6	80,0	81,3	—	80,3	78,8	—				N W	N E	N E	Clear	F Cs.	Cl. th.&lt.
14	,890	,930	,910	,880	,850	,890	—	71,6	78,5	80,1	80,0	78,3	77,9	—		0,135		N	E N E	N	Cloudy	Cloudy	do do do
15	,850	,900	,900	,860	,829	,840	—	72,5	80,0	78,8	79,7	78,9	78,2	—	0,587	0,327		N E	N E	N E	do	do	do do do
16	,830	,890	,890	,840	,820	,838	—	71,3	77,0	79,2	79,4	77,2	77,5	—	1,781	1,721	1,576	N	N E	N E	Rain	do	Rain.light
17	,850	,890	,880	,844	,830	,850	,870	69,1	76,0	78,6	79,8	78,0	77,5	77,4	1,347			N W	E	N E	do	do	FC s.
18	,824	,880	,876	,864	,849	,865	,854	69,9	78,2	79,7	79,8	78,2	79,9	77,5				N W	N E	N E	F. C.	do	Th.h aze
19	,840	,865	,846	,814	,790	,830	—	70,8	78,2	78,0	76,9	76,1	75,8	—		0,102		N	N	N	Th.haze	do	Cl. th. lt.
20	,779	—	,810	,726	,720	,765	—	70,0	—	74,5	72,0	71,9	—	—	1,834	7,823		N by NW	N	NbyNW	Cloudy	Rain	Rain
21	—	,750	,714	,690	,689	,733	—	—	68,8	67,0	67,3	67,8	68,0	—	2,868	0,119		—	N N W	N W	do	Cloudy	Cloudy
22	,730	,810	,815	,794	,780	,812	,820	63,0	71,7	75,7	76,0	74,9	74,2	74,1				N	N	N	Clear	Clear	Cl.hy.dew
23	,810	,880	,857	,870	,805	,820	,832	65,1	76,0	87,3	78,2	76,3	74,9	73,9				N W	N N W	N	do	do	do do do
24	,800	,882	,870	,858	,855	,865	,880	67,7	76,0	76,2	79,0	76,7	74,1	72,9				N	N by W	N	Haze	Haze	do do do
25	,865	,920	,912	,869	,880	,910	,909	65,8	75,4	77,3	78,2	76,0	74,9	73,7				N	N	N E	Clear	Clear	do do do
26	,900	,965	,937	,892	,900	,925	,930	65,6	75,6	77,4	78,3	76,0	75,0	73,4				N E	E	N E	do	do	do do do
27	,910	—	,965	,920	,930	,960	,979	67,3	—	77,7	78,0	76,3	75,8	75,2				N	N W	N W	do	do	do do do
28	,950	,989	30,015	—	,960	,982	30,000	67,9	76,2	78,0	—	76,8	75,2	73,9				N	N E N	E by N	F. C.	F. Cs.	FCs.do do
29	,980	30,000	30,005	,959	,960	,980	—	67,0	76,8	79,5	77,6	76,3	75,8	—				N	N E N	E by N	Clear	Clear	Cloudy
30	,970	29,990	29,996	,954	,945	,969	—	67,9	76,4	77,6	78,3	77,0	76,3	—			1,890	N W	N E	N E	Haze	Cloudy	do
Mean	29,841	29,881	29,878	29,834	29,827	29,857	29,883	70,4	77,9	79,3	79,1	78,1	76,1	77,1									

Memorandum—The wet bulb Thermometer was broken on the 30th October.

METEOROLOGICAL REGISTER, KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF DECEMBER, 1836.

	GILBERT'S STANDARD BAROMETER.							THERMOMETER BY BATH.							RAIN.			DIRECTION OF WIND.			REMARKS.		
	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.	Evaporation.	Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1836	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	o	o	o	o	o	o	o	In.	In.	In.						
Dec. 1	29,960	30,009	30,012	29,970	29,963	29,989	29,980	70,8	78,2	79,3	79,5	78,3	77,8	77,5				N.	NE.	NE.	Cloudy	Clear	F Cs.
2	,952	29,982	29,990	,955	,945	,979	,990	70,7	78,2	79,5	80,2	78,3	77,9	77,6				NE.	NW.	do	F. Cs.	do	Cr. light.
3	,979	30,000	,990	,970	,980	,990	,980	71,2	78,9	79,2	80,0	78,3	77,7	77,4				do.	NE.	do	do	F. Cs.	F. Cs
4	,980	—	30,030	,990	,990	30,000	30,04	70,5	—	79,0	79,0	78,0	77,2	76,2				do	do	do	Clear	do	Clear
5	30,020	30,070	,060	30,020	30,020	,040	,050	68,6	77,7	78,0	78,8	76,8	75,9	75,0				N.	do	N.	F. Cs.	Clear	do
6	,040	,070	,060	,020	,020	,060	,030	68,0	76,3	78,4	78,3	76,3	76,1	75,8				do	do	do	Clear	F. Cs.	do
7	29,960	,080	,070	,020	,010	,05	—	67,9	77,5	78,0	78,6	77,0	76,2	—			1,520	do	E.	do	do	do	F.Cs
8	30,040	,060	,050	29,990	29,990	,010	—	67,7	76,2	76,4	76,2	74,8	74,3	—		0,120		do	N.	NE.	Cloudy	Cloudy	Cy. light.
9	29,990	,050	,020	,980	,990	,000	—	67,5	74,4	75,0	76,7	75,0	74,2	—	0,287	0,087		NE.	E.	NW.	do	do	C. rainb.
10	30,010	,070	,040	30,000	30,000	,010	30,010	68,3	75,7	77,2	77,8	76,3	72,1	75,8				N.	N.	NE.	F. Cs.	do	F.C.dew
11	,010	—	,030	29,990	29,980	29,990	29,980	68,5	—	76,4	77,7	76,2	74,6	73,6				do	NNE.	NE.byN.	do	F. Cs	Cr. dew
12	29,990	30,030	,010	,970	,970	,980	,970	65,7	74,8	76,8	77,5	75,8	74,1	73,7				do	N.	N.	Clear	Clear.	do
13	,970	29,990	29,980	,950	,95	,96	—	69,1	75,3	77,5	77,7	76,3	76,0	—				NE.	do	do	F. Cs.	F. Cs.	Cloudy
14	,940	30,020	,990	,950	,930	,95	—	67,9	73,0	74,5	75,6	72,9	72,5	—	0,117	0,227	1,371	N.	do	do	Cloudy	Cloudy	do
15	,930	29,990	,990	,930	,920	,960	—	67,3	75,7	74,0	75,5	73,7	73,9	—	0,180			do	do	do	do	do	do
16	,950	,990	,980	,940	,930	,980	—	68,0	77,8	77,5	77,8	76,3	75,8	—	0,617	0,357		NW.	E.	NE.E.	do	Clear	F. Cs.
17	,950	30,030	30,010	,950	,94	,960	29,97	69,3	76,4	78,5	78,6	76,3	75,9	75,6				N.	NE.	NE.	F. Cs.	F. C.	Cr. dew
18	,960	—	,000	,940	,94	,99	30,010	68,6	—	78,0	78,	76,5	75,6	73,9				NE.	do	do	do	do	do
19	,992	30,056	,032	,970	,980	30,012	30,030	65,3	74,8	76,6	76,8	75,4	74,7	73,2				do	do	do	do	Clear	F.C. dew
20	,960	,004	29,980	,920	,942	29,968	29,99	65,5	74,7	76,3	76,5	74,3	71,8	70,1				N.	do	do	Clear	F. C.	do
21	,962	,022	,986	,930	,9	,960	,990	66,0	76,2	77,8	79,2	74,2	72,1	71,8			1,100	do	N.	do	do	do	F. Cs.
22	,94	,000	,986	,950	,944	,974	30,000	68,2	74,3	78,8	80,2	75,6	74,4	74,8				—	do	do	Haze	Cloudy	Th. haze
23	,974	,028	30,000	,952	,93	,952	,000	69,9	75,3	78,3	78,6	74,4	74,2	73,				N.	E.	do	Cloudy	F. C.	Cr. dew
24	,960	,016	29,992	,940	,930	,948	29,970	68,8	75,2	76,0	76,7	74,2	73,3	71,6				NE.	NE.	do	F. Cs.	do	do
25	,938	29,992	,9 0	,914	,910	—	—	66,4	76,5	78,4	79,3	74,8	—	—				do	—	—	Clear	—	—
26	,91	,974	,940	,900	,892	29,924	29,950	68,0	76,1	77,7	78,0	76,2	75,8	75,5				do	NE.	do	F. C.	Coudy	F. Cs.
27	,950	30,012	,950	,950	,942	,986	—	75,5	78,3	78,0	79,5	77,7	76,1	—				do	E.	do	Cloudy	F. C.	Cloudy
28	30,008	,076	30,080	30,022	30,020	30,054	—	73,7	78,4	80,5	78,5	77,0	76,3	—	0,097		1,383	do	do.	do	do	do	do
29	,080	,108	,086	,038	,036	,084	—	75,4	79,7	79,6	79,4	76,3	76,2	—				NE.byN.	NE.	NE.byN.	do	do	do
30	,054	,092	,066	,012	,004	,024	30,040	75,9	77,	77,6	77,5	76,0	75,2	76,0		0,027		NE.	do	NE.	do	Cloudy	do
31	29,992	,036	,002	29,954	29,942	29,978	29,998	69,3	78,1	79,3	78,8	75,8	74,3	74,0				do	do	do	F.Cs.	F. Cs.	F. Cs.
Mean	30,978	30,031	30,011	29,967	29,964	29,991	29,999	69,1	76,2	77,7	78,2	76,	75,1	74,6	—	—	—						

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Traditions concerning the Migration of Buddhists into Europe.

By the Reverend B. Schmid.

The Icelandic historians, to whom we owe our knowledge of the most ancient history of the north, and amongst whom Snorro Sturlesen is the chief, state that Odin or Wodan was the first conqueror and legislator of the north of Europe. In their writings the following notices are scattered.

About sixty years before the Christian era, when the Romans subdued the world, Odin, in order to remain independent, left his country, named Tyrkland, on the Caspian sea, between the Borysthenes and the Tanais, and came with his followers to the shores of the German ocean, where the nations, astonished at his wisdom and splendour, took him and his companions for messengers from the gods, and submitted willingly to their rule and instructions, because they acted with mildness and benignity. Odin united those tribes under one form of government, and made his sons their leaders.

Odin being informed that there were fine meadows in Sweden, went thither and built a town which he called Sigtun,* either after himself, for he was also called Sigge, or after one of his sons. But the Swedes named that town, *Asegarth,* i. e. the habitation (city) of the Asiatics.

Odin established the worship of the god *Thor* and the belief in immortality in *Walhalla.* A temple of Thor, near old Upsála, built by him, is said to exist still and to serve as a village church.

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* *Sieg,* in German, means *Victory; Sigtun,* therefore, may mean the town of Victory, or the town of the Victor.

He extended his power far and wide, and constituted his sons viceroys in Saxony, Denmark and Norway. He even returned several times to his native country to fight against the Romans.

When Odin had firmly established his power in the countries subject to him, many Asiatics emigrated thither. A number of Swedes seems to have withdrawn from his authority and to have fled to Finland, and still farther to the north, whither Odin did not penetrate. These people were called Lappes,* i. e. fugitives. But they called themselves Sáme or Sabni.

His tomb and the tombs of his wife, Freia or Frigga, and of twenty of his successors, are still to be seen near Gamla Upsála. The northern nations came every year to the temple of Upsála, where they sacrificed, burned children, and hanged men. Until this day the peasants make pilgrimages to a spring, about a mile distant from Upsála, and memorable through ancient traditions. They drink of the water of that spring and pronounce prayers. Another tradition affirms that Odin concluded his active life at *Odensee*, one of the most ancient towns in Denmark. Thus far the Icelandic historians.

A tradition from quite a different and unsuspected source, remarkably coincides in the main point with these narrations of the Icelanders. It is one preserved by Tacitus, who says in the third chapter of his *Germania:* " Some imagine that Ulysses, in the course of his long and fabulous wanderings, was driven into this ocean, and landed in Germany; and that Ascipurgium, a place situated near the Rhine, was founded by him and named Ασκιπυργιον. These allegations I shall neither attempt to confirm nor to refute: let every one believe concerning them as he is disposed."

Who was this Ulysses?—We know that the original seat of the Pali and Sanscrit dialects, the language of the Buddhists and of the ancient *Brachmanes*, is to be sought in the Himalaya range, or more generally speaking, in the mountainous countries of middle Asia, from whence various tribes must have, in different ages, descended into the plains of India, and likewise emigrated towards the north and the west; —we know, likewise, that the ground-work of the Greek, Latin and German languages is Pali, Sanscrit or Pracrit; and it is a most remarkable fact that the very same day of the week, which the Tamulians call *Buden-külamei* (புதன்கிழமை or Buddhu's day), is denominated by the Teutonic nations, *Wodans-day*, (in English, *Wednesday*). This coincidence cannot have its origin in mere accident! Moreover, Ulysses certainly never came to Germany; but when the Germans related to Tacitus, or to some other inquiring Roman, that a certain Odin had come amongst them from a far country, what is more natural than that the Roman took it for granted that the Germans alluded to *Odysseus*, changing this name into *Odin*, which is certainly not so great a corruption of the Greek word, as the word *Ulysses*. The meaning of *Ascipurgium* is clear from the Icelandic tradition; *burg* (a fortress) in German is the same as *burgh* or *borough* in English; and puri and puram (புரி, and புரம்) in the Sanscrit dialects of India, and is identic with *garth* in the word, *Asegarth*, since *garth* is the same as *guard* in English, and *garde*, *garder* in French, viz. an *enclosure*, a fortress, a city, as well as a *garden*;—and "*Asburg in the county of Meurs*" may as well have been built by the *Asiatic* followers of Odin, as Asegarth in Sweden, and Odensee in Denmark. But I abstain from further etymologies.

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* *Laufen* in high German, and *lopen* in the nether Saxon dialect, means *to run*, *to flee*,—hence the English word *elope*.

Thus much seems to be evident, that Tacitus mistook Odysseus for Odin or Wodan. The same author says in his second chapter, "The Germans, in their ancient songs, which are their only records or annals, celebrate the god Tuisto (or Tuiscon), sprung from the earth, and his son Mannus, as the father and founders of their race. To Mannus they ascribe three sons"—whose names are supposed to have been Ingäff, Isläf and Hermin. We must infer from these passages, that in Tacitus' time, Wodan had not yet attained to divine honours (at least not in the western parts of Germany where Tacitus had gathered his information), and that consequently the tradition of the Icelandic historians is correct, that *one of the last immigrations of Asiatics into Germany took place at the time of the Mithridatic war.* I say, *one of the last*, for the Huns came from the mountains of middle Asia, possibly by the very same road as Odin; and the Greek and Latin languages are evidences that, long before Odin, various other tribes who spoke Sanscrit, settled on the continent of Europe.

In conclusion I cannot but advert to the judiciousness and truly philosophical spirit, which Tacitus displayed in not rejecting at once as nonsense and passing over in silence, a national tradition, although he individually was not prepared to credit it. Posterity, after nearly 2,000 years, understand the hint thus given by him, and thank him for it. And I feel persuaded that many, apparently absurd, legends scattered in the Puránams or preserved in the mouth or songs of quite illiterate tribes, if critically examined and cautiously compared with collateral historical facts, will lead to discoveries still more curious and important.

A brief notice of some of the Persian Poets.—By Lieut. T. J. Newbold.

(*Continued from* No. 14, P. 132).

Kadiri,

قادري

Or *Abdal Kadir,* was formerly in the retinue of the emperor *Akber* with *Shaikh Faizi* and *Abúl Fazel.* He compiled the *Tarikh-i-Bedawin.* His style is said to be easy and flowing.

Kamil Ahmed Beg,

كامل احمد بيگ

Son of *Mirza Afzal Nujm,* came with his father from Persia into Hindustan and entered into the service of the emperor *Alumgir,* by whom he was ennobled. He espoused the daughter of *Khan Mahomed Tahir,* vizier to *Alumgir,* and a noble of high family. He was invested with the killadarship of the fort of *Talnair* in *Khandeish.* Shortly after this, according to his biographer, " The Sultan, the soul, evacuated its fortress, its body." He is said to have composed a *Diwan,* which I have in vain attempted to procure a copy of.

Karkashi,

كاركاشي

Or *Najin-uddin,* was the panegyrist of *Khajeh Khaldi,* by whom he was preferred to his rival *Kemal-uddin Ismail Zanjáni.*

Karkhi,

كرخي

Of *Cazvin.* A poet of some genius. The following quatrain, in answer to *Seraj-uddin Kameri,* is quoted by his biographer:

رباعي

گفتی که گنه نزد من سهل بود
وین نکته نگوید انکه او اهل بود
علم از بي علت تو عصیان گردد
نزد عقلا از غایت جهل بود

Rubái.

Thou hast said " sin in my opinion is not folly."
A man would not have spoken thus;
Wisdom would be sin, according to thy unreasonableness;
This by the wise is deemed the height of folly.

Karkhi flourished in the seventh century of the Hejira, during the reign of *Abaka Khan.*

Kashani.

کاشانی

Also called *Ghurúri,* a native of Persia who travelled into Hindustan and resided under the patronage of *Abdur Rahim Khan, Khankhanan,* to whom he dedicated a *Sáki-nameh,* written in a flowery style.

Kasim,

قاسم

Or *Kahi Kabili,* was cotemporary with *Jami,* whose society he sought. He lived nearly one hundred and twenty years. His poems are intermixed with the compositions of other authors.

Kahi was well versed in theological matters, and in the dreamy species of metaphysics, professed by those Mahomedan enthusiasts, the *Sufis.*

Kasim Anwar.

قاسم انوار

A man of rank and birth and a good poet. He is the author of a *Diwan,* flourished during the reign of *Alumgir* and was educated at Ispahan.

Kasim Khan.

قاسم خان

Author of a *Diwan.* He was brought up at the court of *Jehangir* and in 1041 A. H. was made governor of the province of *Acca* by *Shah Jehan.* He became a distinguished patron of poets. *Asef Khan* was his grand father.

Kasim Mushahedi.

قاسم مشهدي

Or *Kasim Diwáneh,* one of the disciples of *Reshid Mirza Sayeb.* According to the *Tazkirat-i-Serkhush,* he possessed a vivid imagination and an elegant manner of expression. His ideas are lofty, and his works full of abstruse allusions. He lived during the reign of *Shah Jehan.* The *Tazkirat-i-Serkhúsh,* contains a specimen of his style.

Kelim.

کلیم

Or *Talib,* was born at *Hamadan* in Persia, and is a cotemporary of *Kúdsi* and *Sheida,* who flourished in the reign of *Shahjehan.* This

" nightingale of the rose-garden of literature," as he is called, when young, spent a considerable time in the acquisition of the sciences at *Shiraz*, and then travelled into Hindustan to the court of *Shahjehan.* He died on the road to *Cashmir*, whither he had been sent to versify the *Badshah-námeh. Mahomed Afzal*, the author of the *Tuzkiret-i-Sirkhúsh*, says that he retired to *Cashmir* after the completion of his *Zefer-nameh.* He wrote an account of *Akber-abad*, of a famine in the Deccan, and of his travels to *Cashmir*, in form of a *Masnavi.* He is also author of a *Diwan.*

Kemal uddin Ismail Isfaháni.

كمال الدين خاجندي

This poet flourished in the seventh century of the Hejira, and died A. H. 639; or, according to some authors, was slain by infidels. Doulet Shah fixes the date of his demise in 635 A. H. Among the compositions of *Isfaháni* is a *Diwan* comprizing about 9.900 couplets—a poem in eulogy of the sultans of the Syed dynasty, particularly of Sultan *Jelal-uddin.* A collection of tracts entitled the *Russáib al Fani;* and, according to D'Herbelot, " un poeme allegorique sur les cheveux, dont le sens est fort caché, quoique le nom de cheveux soit enfermé dans chaque vers." There is much beautiful imagery interspersed throughout the compositions of this poet. *Isfaháni* was compelled to quit his native city Ispahan, on account of the persecutions of several of the principal inhabitants, who were envious of the honours he received at court. He assumed the habit of a dervise and retired to a secluded spot; where, however, the horrors of the Tartar invasion under *Genghiz Khan* soon reached him. The people of the neighbouring villages had consigned to his care all their scanty savings, in order to conceal them from their rapacious invaders. *Isfaháni* humanely acceded to their wishes and deposited the sums in a deep dry well near the hermitage. One day it unluckily happened, that a Tartar archer, shooting at a bird perched on the top of the building, dropped the ivory ring of his bow down a crevice, communicating with the well. The Tartar, in his search after the ring, found the concealed treasure. The circumstance soon became noised abroad, and the archer's comrades imagining that *Isfaháni* had more valuables hidden, put him to the torture and threw him into imprisonment. The unfortunate poet, deprived of the ordinary means of writing, was wont to pour forth the lamentations of his soul in the Tasso-like bitterness of despair, in stanzas written with his own blood on the walls of the dungeon. For farther particulars regarding *Isfaháni* the Persian reader is referred to *Doulet Shah*, the Nigaristan and the *Manár-us-suwábit.* He was styled " *Malek-us-Shora*"—the prince of poets.

Kemal-uddin Khogendi.

كمال الدين اسمعيل اصفهاني

Flourished in the eighth century of the Hejira, and died A. H. 792. He was buried at Tabriz. *Sultan Hussain* held *Khogendi* in great esteem, and loaded him with favours. *Abdal Basit* in the *Manár-us-Suwábit* states that most of the *Ghazls* contained in the *Diwan* of *Khogendi*, resemble in metre those of Hafiz ; and remarks that, "the *Ghazls* of Khogendi (for which he is celebrated) though inferior to those of Hafiz, must nevertheless hold a high place among the productions of true poets."

Khogendi performed the pilgrimage to Mecca. He died in such indigence, that nothing but a mat and a rude stone, which constituted his pillow and bed, were found in the house at his death.

Khacáni.

خاقاني

Or *Afzel-uddin Bin Ali Aiishir Shirwáni,* a celebrated poet whose compositions are remarkable for elegance of style, originality of invention and beauty of language. He died A. H. 583, and was buried at the *Mukbaret us Shora* at *Tabriz.*

He celebrated the two *Iraks,* in a poem styled, *Irakein**, and is author of two other compositions in praise of *Sultan Ala-uddin Bin-al Arslan Takash,* and *Khajeh Jemal-uddin Musuli.* The latter he sent to the *Khajeh* at *Bagdad,* who returned the compliment, not in kind, but by an ass load of "white gold," (silver). On its arrival, *Khacáni* fancied the contents of the bags to be gold ; but on discovering his mistake, petulantly exclaimed "take it back and return my poem with all speed, and I will send the *Khajeh* a satire in lieu." During the night the prophet *Khizr* appeared to the irritated poet in a dream and said—

مصرع

احسان اور دمکن که ولي نعمت ماست

Reject not the bounty of one who is my benefactor.

Khacáni relented and sent some verses to the *Khajeh,* expressive of his grateful acceptance of the present.

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* This poem, according to the author of the *Zuwábit-i-Azim* is written in the measure *Hazaj Ajzab Mukbus Mukhzuf Musaddas.*

Khacáni's native country was *Ferghaneh*[*] in *Turkistan.* During the commencement of his career he became one of the courtiers of *Manuchehr*, sultan of *Shirwan*, but having resolved to retire from the world, he quitted the court and put on the habit of a *Zahid* (a religious recluse). The Sultan, on *Khacáni's* refusal to return, ordered him to be brought back by force, and imprisoned seven months. Our poet, who was of a vigorous turn of mind, employed himself in the composition of a *Kassídeh*, in which he treated religion with such apparent contempt, that his friend *Azuri*, thought fit to write a commentary thereon, in order to clear the author from the charge of infidelity.

Khacáni, after his release, made a pilgrimage to Mecca in company with *Khajeh Jemal-uddin Mussuli*, and wrote a poem descriptive of the countries through which he travelled, and the fatigues he underwent on his way to the holy shrine. A copy of his work on the two Iraks, entitled the *Tohfet-al-Irákein*, is to be found among the valuable collection of Oriental MSS. made by Jonathan Scott, Esq.

Mention is made of *Khacáni* by *Addal Basit* in the *Manár-us-Suwábit.*

Khajeh Hatifi.

خواجه ها تفي

Nephew to the celebrated poet *Jami*, composed a *Khamseh*, taking that of *Nizâmi* as a model.

When *Shah Ismail* defeated and slew *Sheibek Khan*, sultan of the *Usbeks* prior to his taking possession of *Khorassán*, *Hatifi* went to visit him at the city of *Jam* in *Khorassan*, and was charged with the task of celebrating his victories in verse. The poet, however, had not composed more than a thousand couplets when " death placed the seal of silence on his lips," A. H. 900.

Khajeh Kermáni.

خواجه کرماني

Was born in the province of *Kermán* about 680 A. H. He died A. H. 742. Among his compositions are the *Rouzet-al-Anwar*, a *kemal-*

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[*] " Farganah, nom d'une des contrées de la Transoxane, dont la ville capitale porte le même nom. Le nom d'Andoghian et d'Andugian lui est aussi commun, quoi que ce soit proprement une de ses dépendances, aussi bien que les villes de Coba et de Nessa. Ce pays s' étend le long du fleuve Sihon ou Jaxartes quoi qu'il ne soit qu'a 92 degrez de longitude, et a' 42 degrez, 20 minutes de latitude Septentrionale, selon les tables d'Abulfeda dans le cinquieme climat, quoi qué Alfragan la placé dans la fin du quatriéme."—*D'Herbelot Bibliotheque Orientale.*

nameh, several *risâlehs*, and a *Diwan* comprising twenty thousand verses. The *Kitab Humai Humaiyún* is also from his pen. It is an historical poem composed at *Bagdad*, *Kermani's* favourite place of residence. From *Bagdad* he travelled into *Khorassan*. He was a disciple of *Shaikh Ola*.

There are two other poets bearing the appellation of *Kermáni. Mir* and *Ahmed*. The latter was cotemporary with Tamerlane, and has left the histories of Alexander the Great, of Genghis Khan and of his patron Tamerlane in verse.

Khalis.

خالص

Author of a *Diwan*, flourished in the 12th century of the Hejira.

Khanzeman Bahádur.

خان زمان بهادر

Was one of the nobles attending the court of *Shahjehan*. He died A. H. 1044, in the subadarship of the Deccan. He is author of a *Diwan*. *Khanzeman's* father *Zemanah Beg*, commonly styled *Mukàbet Khan*, is still more celebrated for poetical talent than his son. Some account of him is to be met with in the *Tuarikh-i-hind*.

Kudsi Mushahedi

قدسي مشهدي

Came into Hindustan in the fifth year of *Shahjehan's* reign. He was courteously received and treated with the highest esteem by this monarch. The following is one of his couplets:

بيت

من آن نيم كه كشم سركشي زتيغ جفا
چوشمع زنده سرخويش ديده ام برپا

Beit.

I am not one to be driven away by the cruelty (of my mistress),
But like the burning taper, look on with erect head.

An Account of the Tribe of Mhadeo Kolies.—By Captain A. Mackintosh, *27th Regiment Madras Native Infantry, Commanding Ahmudnuggur Police Corps.*

(Concluded from our last).

The Goturany.—The Mhadeo Kolies have an institution or tribunal termed Goturany, composed of six persons, the establishment of which seems to be coeval with the original formation of their caste. The judicial functions of the members of the Goturany are of a serious and important nature, being to regulate and watch over the moral conduct of all the members of their community; to check the spread of licentious manners, and the infringement of the rules of their caste; to legitimatize natural offspring and to adopt children and females of other tribes into their own caste. The designation of the persons composing this court and the manner in which they conduct their proceedings I shall now relate.

1st.—Is the Ruggutwan or president.—2dly. The Mettull or deputy.—3dly. The Sablah or constable.—4thly. The Dhallia.—5thly. The Murkiah.—6thly. The Hurkiah.

The members of this court whose appointments were hereditary, acted under the authority of the chief Koly Naik of the caste, who formerly resided in Joonere. The Rugutwan resided at Raja poor, two miles from Joonere. He is a member of the Shesha Kool, one of the grand divisions of the tribe, and in addition to his juridical appointment, he was the Patell of his village. No transgressor of the rules of their caste is considered absolved and re-admitted into their tribe, until he has partaken of food from the same dish with the Ruggutwan.

It was the Ruggutwan's duty to issue instructions for the seizure and trial of such persons as were accused of having transgressed the rules and customs of their caste. However, previous to the trial, the Ruggutwan had either to wait on, or announce to, the chief Naik the particulars of the charge, and he then issued his orders for the assembling of a Punchaiut.

The Mettull assisted the Ruggutwan to the extent of his power, and was authorized to act for him in his absence. He is a member of the Keddar division of Kolies, and the president's deputy.

The Sablah is a member of the Kheersagur division, and may be considered the constable of the Goturany. It was his duty to be very much on the move, and to be constantly making enquiries respecting the conduct and habits of the people—particularly of such as were suspected of leading a licentious life; he seized accused persons and handed them over to the Ruggutwan. The Sablah when employed on a tour of duty was entitled to receive, from the village in which an offender resided, a perquisite of one rupee and a half, and a fowl.

The Dhallia is a member of the Shesha division; his designation partly explains the nature of his office, for Dhallia[*] means a branch. Therefore when a person, charged with having offended against the rules of the caste, refused in the first instance to obey the summons of the Ruggutwan, or he subsequently remonstrated against the decision of the Punchavit, and declared his determination of not submitting to it—measures were taken by the members of the Punchaiut to excommunicate him from his caste. The Dhallia therefore was directed to proceed to the village where the delinquent resided; upon his arrival there he announced to the inhabitants the intention of the Punchaiut to denounce the accused, for that he was about enforcing the preparatory measures for expelling him from his caste, unless he showed symptoms of repentance; otherwise it would be necessary for them to be on their guard and hold no communication with him: the Dhallia then taking a bough of the oombre or jambool tree, or of any other, if one of these was not procurable, he walked round the offender's house and afterwards placed the branch on the roof above the door.

The Hurkia is a member of the Shesha Kool or division, and his duty consisted in fastening the hurky, or bone of a dead cow, over the door of the offender's house; this proceeding constitutes the formal act of expulsion from his caste; for it completely debars him, and such of his family as may have remained in the house with him, from holding any intercourse with his other relations and friends; for such persons as dared to communicate with him, became involved in the same misery and were considered contaminated and no better than the most infamous and lowest outcast of the Hindoo community. As no more terrible calamity can well befall the Hindoo, than having the ban of excommunication fulminated against him, he will throw himself on the mercy of the Punchaiut to avoid it, or to remove it, if he has been placed under it, unless he is an inveterate rogue, or become desperately attached to some siren, who has persuaded him to abandon his family and kindred for her society.

The Murkiah is a member of the Shesha division or Kool—he forms one of the Punchaiut, and when a person has been readmitted into his caste, or a man's house and family have been polluted by some transgression against the rules of their caste, the Murkiah has to attend to see the place cleared out and the ceremony of purification performed. The Murkiah is entitled to take away with him all the murkees or earthen pots piled[†] up in the corner of the house, probably containing a small quantity of fine rice, dall and other grains, spices, onions, salt, &c. and he replaces these with new murkies: he was enabled to purchase new ones as he receives a portion of the fine that had been levied from the offender.

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[*] Dhallia—the branch of a bush or tree.

[†] All classes of natives invariably keep a small quantity of fine or rare grains, onions, salt, turmeric, spices, &c. in earthen pots of various sizes, piled up one over the other in the corners of their houses, most commonly in the apartment allotted for cooking or near it. The largest pot is at the bottom and as they successively decrease in size, the one forms

I have stated before, that it was customary for the Ruggutwan to apply to the chief Koly Naik for his permission to have a Punchaiut assembled for the purpose of investigating the conduct of the accused; but, previous to his doing this, he consults with the offender to ascertain with what amount he will present him if he gets him readmitted into the caste, and gives him, or to his son or daughter, one of his own children in marriage; the accused will probably mention that he will give five, ten, twenty or fifty rupees. He pays this in addition to the penalty that may be awarded against him by the Punchaiut of which the Ruggutwan gets his share also—when he was brought before him by the Sablah, four or five Patells of villages in the vicinity were summoned, and these, with the members of the Goturany, constituted the Punchaiut—a Brahmun, or person who could write, was required to be in attendance to record these proceedings; and the accused was then called on to state if he was willing to abide by the decision of the court, in which case he gave them a paper to that effect. The testimony of the witnesses for and against the accused having been taken down, also what he had to urge in his defence, the members of the Punchavit convicted or acquitted him, according to their opinion of the evidence, bearing in mind at the same time the character of the offender, the consideration and influence he possessed in their community, as well as his means of paying the fine that they might impose upon him.

If he were acquitted, and it appeared that there were not any grounds for the charge, and little or no cause whatever to suspect he had committed any crime, his accuser having failed in convicting him, was fined by the Punchaiut, and sentenced to provide an entertainment for the caste.

A portion of the fine (about one quarter of it) was presented to the chief Naik as his perquisite, about an eighth of it went to the Ruggutwan; the other members of the Goturany received a share and the different Patells who attended the Punchavit, also the person who acted as secretary, received a few rupees each. The remainder of the fine was expended in providing an entertainment for the caste, on which occasion, the offender is permitted to eat from the same dish with

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a cover for the other. There is a separate cover for the upper one, so that the contents of all are secured from the attacks of rats, mice and insects. A particular person, but almost always an elderly female, has charge of these pots, as well as of the rest of the grain, ghee, &c. required for the immediate consumption of the family, and she issues from the stores each day's allowance—should she be engaged or have gone outside for a short time, no person will touch the stores, they patiently wait till she returns or has leisure to supply them with what they may want.

the Ruggutwan, and by doing so he is looked upon as absolved from his sins, and re-admitted into his caste. Therefore when the penitent has been shaved and afterwards bathed in some sacred stream, or in water (supposed to be) consecrated for the purpose, he proceeds to the place of entertainment, accompanied by a friend who takes a new thally or brass dish and a new tambia or small copper or brass pot with him, also the money required, and having approached close to where the Ruggutwan is, they sit down, the man places the rupees on the floor and puts the thally on the top of them; upon this one of the attendants puts a little of the meat into it and some water into the pot, after which the Ruggutwan invites the penitent to join him, and they successively take five grasses, or mouthfuls of the meat, which is reckoned sufficient to re-establish his purity. He is then directed to sit in the Puggut, that is with the other guests who are all going to partake of the feast. The thally and tambia become the perquisite of the Ruggutwan in addition to the rupees that were placed under the former.

In the event of the accused declining to attend the summons of the Goturany, the ceremony of excommunication was enforced against him —should he on this account complain to the government authorities, the government call on the tribe to explain the cause of their interfering with the complainant, and when the government have been informed it was on account of his having violated the rules and usages of the caste, he is told that he must abide by the decision of the Punchaiut. This generally led to his being doubly fined for the contempt of their authority, and thus complaining against them.

Should the fine imposed on the offender amount to a large sum, a portion of it was expended at times in repairing the village temple or choultry, and a few rupees presented to any sadhoo or holy character residing in the place.

When a person was convicted of a crime which was considered not one of the deepest dye, and he showed great contrition on the occasion, and was exceedingly poor, his friends urged him to entreat of the Punchaiut in the most submissive terms to forgive him. He then went to the spot near the entrance where all the shoes of the persons composing the assembly were placed, and would take ten or twelve pairs of them, tie them with a piece of string, and then place them on his head; after which he entered the room and appeared before the members of the Punchaiut in the humble position of a penitent. Seeing that he was sufficiently humbled and had not the means of paying a fine, they in general assented to his petition. The offender having obtained so much, he endeavoured to persuade the members of the court to partake of a moderate feast with him (for he would exert himself to raise ten or twelve rupees to defray the expense); the Punchaiut, aware of his poverty, would try to elude his invitation, so that he had to plant himself in their way to prevent their going out until they gave their consent to dine with him. It was a great object for him to gain this point, otherwise, as he had acted in the manner described, and had not broken bread with the Ruggutwan, the stain would attach to his character.

A fine was required to be paid within ten or fifteen days, and the offender was not re-admitted into his caste until he had handed over the amount to the members of the Punchaiut conformably with their decision.

When a boy or girl, the offspring of an illicit connexion, was to be admitted by adoption into their caste, a feast was provided for the Goturany and a portion of the inhabitants of the village. The expense of this ceremony averaged from thirty to sixty rupees, but the amount was generally regulated according to the property the father possessed, for, if he wished to indulge his fancy, he expended a large sum. A man in very poor circumstances, who was anxious to have his child legitimatized, would go about to all his friends and entreat of them to be charitable and assist him in getting the ceremony performed; some would contribute, and, when he had collected thirty or forty rupees, the ceremony was celebrated. An extremely poor and friendless person, who could not raise a sufficient sum in the above manner, would throw himself entirely on the mercy of the Ruggutwan. As the Goturany is assembled for the purpose of hearing his petition, he takes up their shoes, which he rolls up in a piece of cloth, and enters the court; he then represents to them his utter inability to conform to the usual practice of defraying the expense of having his children admitted into the caste, and he entreats of them to adopt them as paupers. A new pot filled with water, and some coarse sugar is brought, and the Ruggutwan gives the child a little of each and the ceremony is finished.

After the feast was over the Ruggutwan engaged to conform to the usual custom of bestowing one of his own children in marriage to the newly adopted one. If all his own children had been disposed of in marriage, he was bound to get one from among his kinsmen; failing here, he had recourse to the Mettull and the rest of the Goturany as they were in duty bound to see the young convert married into one of their own families.

When a grown up female was to be admitted into the Koly caste, a feast on a rather extensive scale was prepared, to which some of the inhabitants of the surrounding villages were invited. When they had assembled, the Ruggutwan or his officer asked the woman a few questions respecting her caste, and the family she belonged to, and if she was willing to relinquish her own tribe to join them. If the Goturany were satisfied that she was telling the truth, and that she had belonged to a caste superior or equal to their own, she was admitted among them, and when the men had finished their dinner, a small quantity was left by the Ruggutwan on his dish to which a little more was added by three or four Patells, and the dish was conveyed to the convert for her to partake of it; she was surrounded at the time by ten or fifteen Koly women, who were to bear witness to her having eaten the contents of the dish that the Ruggutwan had sent to her. This was all the ceremony they thought it necessary to attend to. The expense in former days averaged from one hundred to four and five hundred rupees. If the woman had any children they were admitted into the caste at the same time.

The Ruggutwan was entitled to receive from large or moderate sized villages annually one maund of grain of sorts, one rupee in cash, a seer of ghee and one fowl. From small villages he received four seers of grain, a half seer of ghee, a fowl and half a rupee. A portion of this allowance from the inhabitants he divided among the other members of the Goturany.

The Ruggutwan was obliged to attend the jutra at Bhuma Shunker every third year, upon which occasion he had to shave off his hair and his mustachios, preparatory to his giving an entertainment to all the Kolies of the Mhadeo division that attend the jutra. This occupied him two or three days. The allowance he received from the different villages within his jurisdiction easily admitted of his incurring this expense.

As the duties which devolved on the Ruggutwan, in the country lying between the fort of Shogur and that of Hurreechundragur, occupied his time so much that he could not always proceed into the Kotool, Rajoor and Malldesh districts when his presence was required there, he therefore constituted three persons to act as his agents in those parts of the country. These were persons of three families of Goriah, Koonda and Kondar, with a sablah attached to them.

It is necessary I should explain here that within these forty years past, the authority and influence of the members of the Goturany has greatly diminished, and little or no respect is shown to them now, in comparison to what was paid to them in former times. The people assign various causes for the change that has taken place, but chiefly ascribe it to the very great indifference with which the ex-Paishwah, Bajeerow governed the country. That the Desmookhs, the Brahmuns, Koolkurnees and Koly Naiks were permitted to do as they pleased in the hilly districts, provided they bribed the courtiers at Poona to their satisfaction. The disputes which arose between Bajeerow and his adopted brother, the late Amrootrow, withdrew for a time the attention of government from the management of the hilly districts; the Kooly Naiks and the zumeendars consequently began gradually to usurp the duties and the emoluments appertaining to the office of the Goturany. These Naiks and zumeendars frequently now adjust matters connected with the infringement of the rules of their caste, accepting a trifling remuneration for the same, the sum being much smaller than the Goturany and a Punchaiut would have decreed them to pay. This system has been going on for many years now. If a naik or zumeendar hears of a person having violated their rules, he or she is threatened with exposure and fine; this leads to a bribe being tendered to keep silence, some five or ten rupees or probably a cow; the accused will afterwards go to some other person of influence and ask him to dine in company with him, or he himself offers to become a guest at the zumeendar's or naik's house. A few rupees are offered to this influential person. This would seem to settle the business, but some third person remarks that he does not understand how the affair has been hushed up. The chances are that this will lead to a third bribe being offered—notwithstanding this patchwork mode of adjusting matters that has latterly obtained, all the respectable people look up to the Ruggutwan as being the only qualified person to restore offenders to their caste.

The dealings of the Kolies with the Bunniahs and money-lenders.

In any account of the habits and present state of the Kolies and tribes residing in the hilly tract of country to the east and along the range of mountains termed the Syadry ghauts, it is impossible to overlook the distress and misery that have been caused more or less to every family in that part of the country, by the very exorbitant rate of interest charged for money, and the unjust and unfeeling proceedings of the Bunniahs, who are the merchants and money-lenders settled in the villages in that part of the country. Although I am disposed to think that this misery was originally produced by the excessive exactions of the rapacious agents and underlings of a despotic government on the poor and destitute Koly farmers, which compelled them to have recourse to the money-lenders to satisfy in the first place the demands of the State; I am satisfied that I can show that the bitter complaints I have often heard the Kolies make of the odious, usurious system of the Bunniahs is perfectly true. I shall confine myself to giving a full and ample explanation of the manner the Kolies, &c. and the Bunniahs manage their affairs in Rajoor as I am better acquainted with the inhabitants of that district; but the same system extends along the range of hilly country I am now giving an account of, as well as in many other places in the Dukhun.

The Bunniahs settled in Rajoor are from Guzerat. There are four distinct families; they constantly keep up a communication with their relatives and friends in their native country, and retire there when they have realised a competency to enable them to live comfortably for the rest of their lives. The four Rajoor shopkeepers by means of agents have each established three shops in various places to supply the forty villages of this dang* and to purchase up from the cultivators whatever grain they may have for sale. It is well known that some of the zumeendars have a share in the affairs of one or two of the shops, and any person of rank countenancing or in any way lending their influence to the Bunniahs, goes far to overawe and silence the poor Kolies, and make them stifle their groans, dreading that they may have cause to repent any complaint they might venture to make against the Bunniahs. I am convinced that I state correctly in saying that their souls groan within them owing to the oppressions they have been subjected to and are obliged to endure; and that they are naturally eager to engage in any undertaking that will afford prospects of being revenged on their enemies, and obtaining toleration for the future.

These Bunniahs exercise their influence to prevent the Kolies selling their grain to any persons from a distance that may come to collect and purchase it; and if a Koly takes his grain to another district bazar, to sell it there to some little profit, the circumstance is particularly noticed by the Bunniah, the first time the Koly comes to him to ask him for the loan of any money; he immediately declines complying with his request, telling him that if he is very much in want, his friend who purchased his grain will of course supply him with any reasonable sum he may require, so he had better go and ask him for it. The Bunniahs even have expressed their displeasure at some Kolies accommodating a few of their friends at Rajoor with a small supply of grain at a trifle under the bazar rate.

The circumstances of all the Kolies, Thakoors, &c. are so well known to these Bunniahs, that when any one of them comes to ask them for a loan, they treat him much in the same manner. Any remonstrance the borrower ventures to make respecting the inferiority of the coin, the high rate of interest, the heavy bonus and the rate of exchange, is immediately answered by the Bunniah remarking "you can of course please yourself, you came here of your own accord, if you are not contented you had better go away, and apply to those that will satisfy you on easier terms." It is to be recollected that these Bunniahs supply the different inhabitants with clothes, spices, salt, tobacco, &c. besides money, and often seed-grain. They very often keep their accounts; this places the people unavoidably very much at their mercy, for there is no free market or competition to reduce articles to their proper valuation, and the management of all affairs is so controlled by these Bunniahs, from the undue influence they possess, that they have established a buying and selling measure. For instance, when they go to the Kolies' houses to purchase grain, they carry a measure with them which is considerably larger than the Kolies' measure, which is the regulation size. The Bunniahs will listen to no remonstrance on the part of the Koly. The difference between the buying and selling measures varies from two to four seers in the value of one rupee's worth of grain.

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* Dang, a quarter or district, but occasionally applied to a wild, hilly, and jungly tract of country.

The following is the mode the Bunniahs in general pursue in charging interest on any sums of money they lend to the Kolies, Thakoors, Kannaras, &c. They charge a bonus or premium of twelve or fifteen per cent. on every sum advanced by them—so they enquire of the borrower if he has brought money to pay the *munoty* (bonus), or if he is to include it in the receipt or promissory note. The Bunniah then will give the Koly eight and a half Bellapoory* rupees (these rupees vary from eight to eleven per cent. inferior to the Poona Ankooshy rupee) and takes his receipt for ten rupees, a rupee and a half being included as the bonus, and the poor man loses equal to a half rupee owing to the inferiority of the Bellapoory rupees. The Bunniah, having an eye to work, stipulates for having the money repaid to him probably in four months, and that he will receive the interest in khoorachny† seed, at the rate of one paillie (four seers) for each rupee of the debt every month. At the expiration of the fixed time, if there is a demand in the market for khoorachny, the Bunniah will send for the Koly to settle his account; otherwise he is not reminded of his debt. At the end of five or six months the Bunniah calls on him to pay up his debt (the truth is, the grain has risen in price); the account is drawn out, the interest of ten rupees a month is ten paillies of khoorachny in five months; this amounts to fifty paillies. This grain is selling at the time (Akhar and Shrawun) it is dear, and only procurable in the Bunniah's shops for about six paillies for the rupee; therefore the interest is 8⅓ rupees the price of the fifty paillies, and as the Koly has no grain in hand he is under the necessity of having the interest added to the capital of ten rupees, which raises the debt to 18⅓ rupees. Should he not have money to clear off this amount, he is not allowed to return to his home until he has satisfied his creditor. To effect this a fresh promissory note is drawn out for the amount, including three rupees as a bonus on the new loan, which raises the debt to twenty-one rupees. The Bunniah now informs the Koly that he will receive the money payable in ghee in the course of three or four months, if he will let him have the ghee at the rate of four seers for the rupee. He will most probably remark that such and such a person had promised to supply him with ghee at that rate, and he adds that if he (the Koly) objects to do so, that he had better pay him his money. The wretched man being at a nonplus promises to comply with the demand of his creditor; when the time arrives for delivering the ghee, the Koly will send to say that he does not possess the means of fulfilling his promise (his cattle may have died, or ghee may have been spoiled, or he may have disposed of it, or the value of it, in some other way); the Bunniah sends again for him and tells him that as he has not got the ghee, he must convert the debt into cash at the rate of the market price of the article, or on more favourable terms. Ghee happens to be selling 2½ seers for the rupee; then we have the original debt twenty-one rupees, multiplied by four seers of ghee equals eighty-four seers, which, at the rate of two and a half seers for the rupee, gives thirty-three and a half rupees. The Bunniah says if you cannot pay me this money now, you must do so at the Hooly festival, when the accounts are usually adjusted. For the accommodation of the parties another promissory note is prepared, including a bonus calculated at fifteen per cent., which brings the debt to thirty-eight rupees. The Koly is informed that, if he will agree to pay the interest in rice or in khoorachny, at the rate of four seers or one paillie for the rupee each month, he may go away to his home, but that he must be prepared to give some articles, ornaments or cattle, in pledge, as security for the payment of the debt. At the expiration of the four months the account will be as follows. Thirty-eight rupees, one paillie interest, equals thirty-eight, which in four months equals one hundred and fifty-two paillies; at the Hooly, khoorachny sells six seers for a rupee, therefore the interest will amount to 6)152(25⅓ twenty-five and one-third rupees being added to the principal raises it to sixty-three and one-third rupees. Should the Koly, either from improvidence or some misfortune, or unavoidable expense, be unable to discharge any part of the principal or interest from the time he incurred the debt, the Bunniah will now remonstrate with him and tell him that he must either pay the money, or pledge some of his cattle, as security for the debt. This being agreed to, he selects some of the Koly's best cows and buffaloes, but will only consent to them at a fifth or sixth under their value, observing, very likely, at the same time, that he does not wish to be troubled with his cattle. The unlucky debtor sees no alternative but complying with his creditor's terms. This time the promissory note is written out on stamped paper; a fresh bonus is included, and a further term of four months is agreed on for the payment; the interest to be paid in rice, ghee, or khoorachny, as may best suit the Bunniah, who tells the Koly that unless he fulfils his engagements, he will lodge a complaint in the court for the purpose of recovering his money. In the promissory note on stamped paper the interest charged is the Dohotary, or twenty-four per cent.

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* Many of the Bellapoory rupees in circulation in the small villages in the hills are of a very inferior description, either much clipped or containing much alloy. A Koly Patell who came to Ahmudnuggur some months ago on business obtained a few rupees from his Bunniah for his road expenses; for four of these he brought on to this place, he could only get twelve annas each; in fact, only three rupees, a loss of 25 per cent. to the poor man.

† A grain of which they make oil.

If the man who has got himself thus entangled in debt is a person of considerable energy, spirited and litigious, he will attend the court in the hope of being able to obtain some redress; but in this he often fails. The vakeels (agents) employed by the plaintiff preclude his having any chance of justice done him, so the scene terminates by having his property sold to satisfy the rapacious Bunniah.

In fact the Bunniahs, before they come to the resolution of prosecuting a man in our courts, adopt every precaution to ensure his being completely ensnared before they lodge a complaint against him. Bonds, receipts &c. are all forthcoming, and duly attested; such other evidences, oral and documentary, as may be required are at hand; the victim to be sacrificed and lodged in jail is carefully selected for the purpose, in the expectation that the trial and sentence may make a more forcible impression on the other Koly debtors.

Many of these men surrender their cattle or pledged property at once to the Bunniah, rather than submit to the vexation, inconvenience, and expense of being dragged from their families and homes to attend the court at a distance, which may decree them to be imprisoned. Others of the Kolies fly to a distance from their homes to escape the tormenting calls of their creditors. Those who abscond, not unfrequently change their names, and too often subsist by leading an idle and thievish life—several of those who joined the formidable gangs that assembled in the Rajoor hills in 1828-29 & 30, were men who had become desperate from being inextricably plunged in debt. They told me, after they were captured, that they joined the gang in the hope of being able to secure some money or ornaments by plunder, to enable them to pay off their debts and reside in peace in their own village.

The poorer classes of Kolies and Thakoors are in some seasons obliged to borrow seed grain from the Bunniahs; for one maund of rice or khoorachny borrowed, they return two maunds at harvest time in ordinary seasons; but in dear years, the Bunniah gives one maund on the promise of receiving three in return. For other inferior grain a half or fifty per cent. is given to the lender. I may add here that such of the Kolies as were of a turbulent disposition and unsettled habits, not unfrequently endeavour to realize by robbery money to pay their arrears of revenue and to settle with the Bunniahs; at other times, the rogues adopted what they considered an indemnifying system with the Bunniahs, that could be neither profitable nor agreeable to the latter.

During a dark night ten or fifteen Kolies would attack the Bunniah's house. They made a point of destroying his book of accounts or any papers they could lay their hands on, by putting them in water and tearing them to pieces. They would, if greatly exasperated, take the Bunniah and one or two of the inmates of the house to a thicket, and pressing a naked sword on their throats, demand money. To expedite the matter, a Koly would probably give a gash to the Bunniah's ear who would instantly make an offer of all the ready money, &c., in his house. One of the party, being previously warned about not giving the alarm, on pain of death, to his comrade, is permitted to proceed to fetch the money. The Kolies cover their faces on such occasions to prevent detection. If one was recognized, it was seldom the Bunniah dared charge him openly with the crime; but some of the ill-paid and corrupt police agents would endeavour to gain the necessary information and avail themselves of the circumstances of the case to obtain a portion of the plunder, for a compromise is frequently entered into on such occasions between the robbers and the police. To guard against fire and other contingencies, the Bunniahs keep now several copies of their accounts with the Kolies. One is lodged with their partner at Rajoor. The only stone-built house and covered with tiles in the Koly villages is that belonging to the Bunniah.

I have been credibly informed that during the Paishwah's government the Bunniahs used to be occasionally warned against being too rapacious in their dealings with the inhabitants of the hills. It is said that when the Bunniahs lodged a complaint against any of these people in consequence of their refusing to pay their debts, that the government officers were directed to investigate the affair, and that, if the claim appeared to be just, an order was issued, directing that the debt was to be liquidated within a fixed time. The government officers always paid themselves twenty-five per cent. of the debt, as a remuneration for the trouble of adjusting the affair.

The above is a specimen of the mode of charging and calculating, the rate of interest for money lent by the Bunniahs; but the Koly's account is frequently a much more complicated affair than the above will give a full idea of. We may suppose that eight and a half rupees or three times that amount has been borrowed to aid in defraying the expense of a marriage ceremony, or pay up his rent or share of the revenue for the current year; the chances are that there is a small balance* of revenue for two or three successive years: then most probably follows a charge of half a rupee for a turban, also one or two rupees for a piece of cloth for himself, or a sary, for his wife. Again a charge of one or two rupees for salt, spices, oil and tobacco for six months. Then a few rupees of very inferior value may have been paid by the Koly, and a consequent deduction made, and a few maunds of ghee, rice or some other grain may have been tendered in part payment, and accepted at the Bunniah's price. In fact the account becomes so extremely intricate that it would require a person of considerable talent and experience in such matters to comprehend it. What is an ignorant and unlettered Koly to do in such case! Although many of these people are very simple and ignorant, they are not by any means indifferent to the difficulties they are likely to be plunged into in consequence of their dealings with Bunniahs. Not unfrequently a poor man who is very anxious to come to a settlement with his creditor, is desirous of having his account previously examined, by hearing all the different items of which it is composed read over, and the calculations of interest explained. He will signify, to the Bunniah that he intends to wait on him on such a day for the purpose and that he will bring the Patell or some intelligent friend with him, that he may be better able to understand how much he is in debt. The Bunniah contrives to defeat this plan, by probably saying, that he will be too much occupied on such a day or that he is going from home, but that if he will come alone some other day that he will explain his account fully and satisfactorily to him.

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* There are many lacs due of arrears of revenue for these eight or ten years past, the balance of each year distinctly recorded and annually or more frequently a small portion is paid off, but this leaves the revenue of the current year partly unpaid.

My anxiety to expose the iniquitous system of dealing that exists between the Kolies and their creditors, induces me to add a few lines more to what I have already attempted to explain on this subject. When I was in the Rajoor hills in April 1829, a very poor Koly came repeatedly to me, urging me to listen to a complaint he had to make, for that the Bunniah of Mootkell, a village in the Rajoor district, had ruined him. At length I received his petition, and forwarded it to the proper authority, intimating to him at the same time that I had not authority to interfere in such matters. The substance of the petition was this: "the Mootkell Bunniah claims ninety seers of ghee from me, although it is only five years since I settled my account with him, at which period I was five seers of ghee in his debt, but by various ways he has raised his claim in five years to ninety seers." Now these five seers would sell for two rupees when ghee was dear; so that a debt of two rupees by charging an exhorbitant interest, payable one day in money or ghee, and another day in rice or khoorachny, amounted to thirty five rupees in five years. Unfortunately this wretched man's case was not a singular one.

History of the Kolies.—We cannot expect to glean much authentic information of an historical description from an ignorant and unlettered people like the Kolies. The few traditions they possess relative to their first settlement in their present locations, and of subsequent events until within the last century, appear to be involved in much obscurity and confusion. However, there is reason to believe that they have occupied their present habitations for many ages; for we find that Ferishtah, the Mahomedan historian of the Dukhun, mentions that Ahmud Nizam Shaw, the first king of Ahmudnuggur, employed a body of Kolies in his army, and when Ahmud's grandson, Hoosain Nazam Shaw, retreated into the hills near Joonere in 1562, at the period his capital was attacked by the confederated Mahomedans and Hindoos, he was joined there by Subajee one of the Koly naiks.

There is a popular tradition among the people in this part of the country, that the Gursees were the original inhabitants of the Dukhun, and that they were displaced from the hilly tract of the country by the race of Goullies or cow-herds. These Goullies it is said, subsequently rebelled against their lawful prince, who detached an army that continued unceasing in their exertions until they exterminated the entire race of Goullies; and it is concluded that the very few who escaped the sanguinary measures that had been carried on against them, were adopted ultimately by the Kolies into their tribe and founded the Kool that bears their name. Be this as it may, there is no family in existence of the original name, but there are two (not very numerous) clans who are the descendants of the Goully Kool: namely, the Damsahs and Waghmoriahs. The Poriah family of the Kuddum Kool, and the Patkoollah clan of the Aghassy Kool, are considered to be the descendants of the Gursees.

With regard to the overthrow of the Goullies and Gursees, the Koly traditions say that these people, having been in open rebellion and plundering the country, an army from the northward advanced through Kandeish by the Kassarbary ghaut to subdue them, but that the rebels having assembled near Kassarbary, they attacked and put to flight the royal army. The king of the country, greatly incensed at this discomfiture of his army, held out prospects of high reward to the person that would head an army which would inflict condign punishment upon the rebels; the country being wild and unhealthy none of the officers in the pay of government would offer their services for this duty; but a man named Sonejy Gopall, said to have been an inhabitant of the Mahratta territory, volunteered his services. An army was then employed under Sonejy who appears to have been joined and ably supported by an active and intelligent Koly named Wunkojee Kokata, whose name and exploits are quite familiar to the Kolies of the present day. The Goullies who had resided in the hilly tract of country were attacked and completely exterminated; and Sonejy Gopall was rewarded by being appointed Desmook of fourteen hundred villages; and the Koly Kokata* was presented with the Mokassa dues of the same number of villages, but as the country previously occupied by the Goullies along the ghauts was completely depopulated, for the purpose of restoring it to prosperity, a number of Kolies from the Ballaghaut* and the Mhadeo hills were assembled and taken to the deserted dwellings of the Goullies and invited to occupy them and cultivate their fields.

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* The descendants of Wunkojee Kokata are now in possession of some right at Joonere; they have always taken a great share and interest in the Koly transactions.

It is a common practice with such of the inhabitants of the plains as bury their dead, as well as the hilly tribes to erect thurgahs (tombs commonly of a single stone), near the graves of their parents. In the vicinity of some of the Koly villages and near the site of deserted ones, several of these thurgahs are occasionally to be seen, especially near the source of the Bhaum river. The people say they belonged to Gursees and Goullies of former times. The stones with many figures in relief roughly carved upon them, and one of these holding a drum in his hand, and in the act of beating time on it, are considered to have belonged to the Gursees who are musicians by profession. The other thurgahs with a Saloonka (one of the emblems of Mhadeo) and a band of women forming a circle round it, with large pots on their heads, are said to be Goully monuments. This might be reckoned partly confirmatory of the tradition.

This account of the Kolies having come from the Ballaghaut and Mhadeo hills is certainly quite the reverse of what might have been expected; it was natural to suppose that they had migrated from the northward, as the tract of country occupied by them is bounded, both on the western and northern sides, by districts in which the Koly population is numerous, and it is quite evident that those Kolies have advanced from the northward. It is to be remarked that the Mhadeo Koly holds little or no intercourse with the other tribes in the adjoining districts. They are considered a more pure and respectable class of people. The Koonbies in the Joonere districts drink water from the hands of a Koly, and will also eat food prepared by them; the few Koonbies in the Kotool and Rajoor districts will do the same, but I believe they have some scruples on this score. However the Koonbies in Malldesh will not partake of water or food from the Mhadeo Kolies in that part of the country; this is said to be in consequence of the vicinity of the other tribes of impure Kolies, in the Nassick and Wunn Dindory districts and in the Attaveessy. If a Koonby has been working for a Koly in Malldesh he will receive rice or flour from the Koly and prepare his own victuals. Tradition says that Bhoregur, Phoolgown, &c. in the Ghorenahir, were the first villages established by the Mhadeo Kolies, and the inference we are to draw from this is, that they gradually advanced northward; to which is to be added the tradition of their having attacked and exterminated the Sombatta and Gursee inhabitants of Malldesh. Another circumstance that would tend to corroborate the tradition of the Kolies having come from the eastward is, that in former times all ceremonies connected with their marriages, births, and funeral obsequies were conducted by the Rawoull Goossynes of the Linggait persuasion—we know that the people of the Ballaghaut are staunch worshippers of the Ling of Mhadeo, and these priests may have accompanied the Kolies in their journey to occupy the valleys of the western ghauts. When the Paishwah attained supremacy in the government at Poona, some Brahmuns intruded themselves among the Koly habitations: these have completely usurped the duties and emoluments of the Rawoulls for seventy or eighty years past. The descendants of some of the Rawoulls are settled at Chauss and Murchur.

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* Ballaghaut is the hilly tract along the western boundary of the Hydrabad territory.

During the wars that were carried on in the Dukhun while the Bhaumny dynasty of kings reigned, also by the Nisam Shawhy kings of Ahmudnuggur, and subsequently by the emperors of Dhelhi in re-establishing their authority over the Dukhun, the Kolies, being a poor people and occupying a strong country, very possibly did not suffer so much from an invading force, or from the governors of provinces, as the inhabitants of the open country.

It is said that, with the view of preserving order among the Koly inhabitants, one of the kings of Bedur established a local police in each of the fifty-two valleys; a Naik and a certain number of Kolies were nominated for this duty, and the Bawun (52) choury at Joonere was fixed on as the head quarters of the police establishment. The Naiks were styled sirdars, and several of them had the title of munsubdar conferred upon them. A Mahomedan* styled munsubdar was placed in charge of the police, as a general superintendant or Sir Naik (chief Naik). However sometimes after this the Kolies from some unknown cause became very discontented, and they assembled to the number of many thousands for the purpose of demanding redress of their grievances from the king, who was passing in the vicinity of the hilly country, arranging the affairs of his government. The Koly force is said to have extended from the vicinity of Ekdurrah near the Puttah fort south and close to the Bolleshwur hills; but, as there was no person of acknowledged ability or experience among the Naiks, whom they could implicitly intrust and depute to the court as their agent to get their affairs satisfactorily adjusted, all seemed to agree that none of them could fulfil the duty so effectually as a poor Koly labourer, surnamed Pauperah, in the employ of the Awary Patell of Khirlay, and who was noted for his intelligence and sagacity. He was consequently requested to act as their chief and representative on the occasion, on which account he was presented with new clothes.

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* There has been no Mahomedan Sir Naick for these 130 years; Mahomud Lattief was the last.

and such few necessaries as his new situation demanded, and all the Kolies engaged to be faithful to him and to obey him. The negotiations did not terminate favourably for the Kolies, as the prince gave orders shortly afterwards to attack them in token of his dissatisfaction. However, Pauperah, by his great activity and vigilance, continued for a series of years to defy the king's troops, and prevented them gaining any advantage over the Kolies, and so completely disgusted the officers of the royal army, by misleading and counteracting all their attempts and plans to punish the rebels, that the king ordered the troops to be withdrawn from the hilly country.

The Kolies having for such a length of time been engaged in hostilities in defending themselves from the attacks of the royal army, and finding nothing to occupy their attention at home, after hostilities had ceased,were allured to plunder the people who inhabited the Malldesh, lying between the Rajoor district and Trimbuck. The inhabitants of this tract Gursees, Sombattees, &c. were attacked and driven away and the country left desolate; however it is said that Pauperah subsequently settled for some time at the village of Mookny near the Tallghaut, where he erected a small mud fort. Having one day proceeded to pay his devotions at the shrine of the deity at Pumpry, he met five holy fakeers; one of these, placing his hand on Pauperah's head, bestowed his blessing on him and said, go down to the Konkan, take possession of Jowair and seat yourself on the Gaddy* there. The Koly replied that it could not be his destiny to be ever elevated so high; besides a Warley Rajah occupied Jowair. The saint remarked, what proceeded from his lips would be realized. Pauperah assembled a body of Kolies and proceeded northward and descended into the Attaveesy; the country around Peint and Dhurumpoor acknowledged him as their master. From this time he was saluted by his followers as Rajah Mookny Kur; and the term Mookny has been continued as the surname of the family ever since. It is said Rajah Mookny paid a visit to Guzerat, and that he prolonged his stay in Katywar for seven years; at the termination of which period he proceeded to Jowair and asked the Warley Rajah to give him as much land as the hide of a bullock could embrace. The Warley Rajah, seeing it would be impolitic on his part to offer resistance to a person of such power and influence as Rajah Mookny, consented. The hide was cut into very fine shreds or strips, and when all were united and extended along the ground, the Warley Rajah saw his small fort and dwelling embraced within the space fixed upon by Rajah Mookny. The Warley, much disheartened, remarked, as you have included my dwelling in the part you mean to occupy, it is incumbent on you to give me some place to reside in. Gumbeergur and the surrounding pergunnah were given to the Warley Rajah, where his descendants continue to reside. The king of Bedur had been encamped some time at Gungapoor near Nassick when fourteen different rajahs repaired to Gungapoor to pay their homage to the prince. It is related that the Mahomedan prince ordered a sumptuous entertainment to be prepared for these rajahs, but all of them, with the exception of Rajah Mookny of Jowair, declined sitting down, as they were Hindoos. The Jowair Rajah endeavoured to remonstrate with some of them, remarking that although the king was a Mussulman he was their master. The king was much gratified with the Jowair Rajah's conduct, and ordered the covers to be removed from off the trays; to the great astonishment of all present, the dishes, which were composed of various descriptions of meats, had been miracuously converted into bunches of beautiful white jasmine flowers. The Jowair Rajah had the title of Patungshaw conferred upon him, and he was presented with dresses and seals of office, and sunnuds or commissions were granted to him, by which he was permitted to retain possession of twenty-two forts, and country yielding nine lacs of rupees of revenue. The Kolies mention that while Pauperah was in the employ of the Patell of Khirlay, a Naikwary sepoy from Akolla, who had been to Khirlay on duty, asked the Patell to allow his servant Pauperah to convey some things belonging to him to Akolla. During the heat of the day both lay down to rest themselves in the shade of a tree; the sepoy fell asleep, and when he awoke he observed Pauperah was sound asleep and a very large snake bending over him with his hood expanded. On seeing the sepoy move, the snake went off; when the Patell heard of this circumstance, he altered his conduct to his servant; he treated him much more kindly, and they ate their meals together; and when it suited him he told Pauperah if he was ever particularly fortunate in this world, and if the umbrella of royalty ever shaded his brow, he hoped he would, not forget his old friends. Eventually Rajah Mookny nominated the Patell Awary to the Patellship of the village of Mookny, and constituted him the chief manager of his domestic affairs, and his descendants are so now at Jowair.

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* A seat of honour—a throne.

Owing to a quarrel that took place between some members of the rajah's family about the year 1760, which led to a reference being made to the Paishwah at Poona, the Paishwah's government continued to interfere with the Jowair affairs until about 1766, when the rajah was deprived of the greater part of his country. At present he has only eighty three villages, and many of these very small. His income last year was estimated at ten thousand rupees; of this sum six thousand were realized by the customs (transit and excise duties) within his jurisdiction, and the rest was land revenue. Jowair is under the collector and magistrate of the Northern Konkan.

For a period of several generations the eldest of the family of the

Kheng clan, a member of the Wunnukphull Kool, held the Sir Naikship or chief rank among the Kolies, and was the principal authority under whom the members of the Goturany adjusted their civil and religious affairs. The Kolies speak of a very great innovation having been introduced in the mode of collecting the revenue of the Koly villages; that in some places their fields were minutely measured, and the value of each fixed, and many other matters investigated, all of which led to much oppression among them, and they resolved on resisting the establishment of the new system. There can be little doubt but that the Koly tradition here either alludes to the measures of reform that were introduced about 220 years ago throughout the kingdom of Ahmudnuggur, by that able and celebrated financier Mullik Umber, or the financial system of the famous Todur Mull, which was established in several parts of the Dukhun by the emperor Shaw Jehan. The Koly Sir Naik Kheng and all of his clan, with many other influential Naiks, thought the time favourable to make an effort to throw off the Mahomedan yoke. We know much dissension reigned among the Mahomedans of the Dukhun at the above period, but the Kolies were dreadfully punished for their temerity. The Mussulmans were highly indignant and enraged at the Koly conspiracy, not only to resist and thwart the orders of their rulers, but to endeavour to establish their own independence, or to transfer their allegiance to a person of Hindoo origin. The insurrection took place during the reign of the emperor Shaw Jehan, and the Kolies may have wished to transfer their allegiance to young Sivajee. An army was marched into the hilly country, and the inhabitants slaughtered wherever the troops could overtake them. With the exception of one or two Kolies of the name of Kheng, who contrived to conceal themselves, the Sir Naik and his kinsmen of the Kheng clan were annihilated. All the hill forts were thoroughly repaired, and a large body of troops left to garrison each, for the purpose of controlling the Kolies more effectually, and with the view of making a more lasting impression on them; all of those that had been apprehended were executed, their heads heaped together, and a platform built over them at Joonere. The place known by the name of the Kalachubootra is said to be the identical spot. After the recollection of this disturbance had passed away, Loomajee Bhokkur, Naik of Peeplegown Mhur Korha, wished to get the people to elect him their Sir Naik; and he was also desirous to obtain the approval of the government authority for his assuming it. To secure the favour of the latter, he reported that the rebels in the fort of Koary had a singularly handsome horse of a noble breed in their possession, which he would try to capture for the emperor, provided he could be furnished with a supply of money from the royal treasury. A large sum was sent to the Koly Naik, Loomajee Bhokkur, who assembled the Naiks of the fifty Mawils with their retainers, and all of them marched and invaded the fort. A year and upwards having elapsed, and there being no prospect of obtaining possession of the horse, the Kolies were told that they were such faithless and such an extravagant set of people, that they could not be depended on, and, unless they captured the fort in less than one month, a number of the Naicks and followers should be put to death in a very disgraceful manner. This threat frightened the Kolies; numbers of them fled to the jungles during the night, and only the Naicks of twenty-two Mawils and their followers remained with Bhokkur, who gave his people orders to prepare their ladders of the Maryelloo, remarking that, as a sentence of death was impending over them, they had much better try to capture the fort, and die in the attempt, than submit to be disgraced. Bhokkur and his confidential friend Bhoirjee Istah, disguising themselves as dheres, sellers of firewood, ascended the fort, and succeeded in bribing one of the garrison to assist them. At the appointed time, this man drew up the ladder and secured it at the top, but when the Kolies reached the place where they were to begin to ascend by the ladder, they discovered it was four or five cubits short. Bhokkur now despaired of succeeding, but Istah cheered him on, and remarked that they both together measured much more in height than the extent of the vacant space. "We shall manage it between us; so you get up on my shoulders, and a third person can reach the ladder from off your back." They soon lengthened it, and seventy or eighty of them ascended the hill. They attacked and overpowered the guards, and were moving off with their prize, when an officer satisfied that to obtain possession of the horse was the cause of the fort being captured, fired and killed the beast on the spot. One of the Mahomedan princes being in the vicinity, expressed his great approbation of Bhokkur's daring spirit, and gave orders for his being brought to court, that he might be rewarded for his services. It is said that owing to an accident that had befallen Bhokkur, which had much disfigured his face, he was most anxious to avoid making his appearance at court; and that he dressed out a friend and despatched him, with directions to say, that he was Loomajee Bhokkur. The deception was detected and Loomajee was obliged to attend himself. When he was introduced to the prince, one of the attendants placed a shield on the Naik's head, and it was filled with as many gold mohurs as he could carry away with him. Loomajee had the title of munsubdar conferred upon him. Moreover it is stated that he built a large house at Joonere under which he had a subterraneous passage or cellar. Superstition and tradition united, maintain that all the riches Loomajee[*] secured at

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[*] It is the general belief, that whoever attempted to descend into the cellar was detroyed. Some fifty years ago Dussajee Bhokkur (who was killed at Hursh) had a son

Koary and his present of gold mohurs were lodged in this underground vault, and that it remains there to the present time.

Shortly after the death of Rajah Shahoo, when the Mharratta power was in its plentitude, under the Paishwah Ballajee Bajeerow, the Poona government was anxious to obtain possession of all the hill forts in the Syhadry range. The Kolies of the Kotool and Rajoor Dangs were urged to capture the fort of Trimbuck; the clans of Kharay and Bhanggrah took the lead in this expedition, with the able assistance of the five brothers of the Puttykur family, who were all distinguished soldiers, noted for their great activity and gallantry, as well as their singular dexterity in climbing up rocky hills that were inaccessible to most men. They secured the friendship of the hereditary Kolies, the guardians of the approaches to the Trimbuck hill, and they bribed a servant belonging to the killadar; then, having sacrificed a sheep to secure the favour of the tutelary spirit of the hill, by means of their rope-ladders, five hundred of them ascended to the top of the rock, forming the scarp on the western side, and without being discovered they obtained possession of the summit of the fort; upon which they winded their horns for the information of the Moghull garrison. These were completely surprized; a few only attempted resistance; others ran about with grass in their mouths, entreating quarter; while others more frightened tried to lower themselves over the precipices, and such as were not killed were sadly mangled. Previous to approaching the fort, some of the Kolies, doubting the possibility of escalading the place, two of the Puttykurs volunteered to prove with what facility it could be done. They started and returned in a few hours with the killadar's silver hooka to convince the Kolies of the ease with which it might be seized. The Paishwah sent the Kolies forty-thousand rupees to defray their expenses. The eldest of the Puttykurs was presented with a palankeen, and Kheroojee Naik was presented with a palankeen, and the village of Barrah was conferred on him in enam (freehold) to support his dignity. Kheroojee's descendants continue to hold this village in enam under the British government; as the family are involved in debt and the Naik was a boy at the time, I suggested some years ago, that the village should be taken charge of by the collector, for the purpose of establishing the best measures to get rid of the claims against the young Naik, as he was surrounded by usurers and persons who plundered him.

whose name was Loomajee. After his father's death, and when he was about twelve years of age, it occurred to several of the friends of the family that it must have been intended that this boy Loomajee should succeed to his ancestor and namesake's treasures, and that, if he would exert himself to obtain the property by descending into the cellar, he would undoubtedly secure it. The poor boy was persuaded to try his luck by entering the vault, but he never returned to relate what he had encountered. There can be little doubt but the mephitic air destroyed him.

But to return to the subject of the hill forts. The Paishwah now expressed a wish to obtain possession of the forts of Kullurgur, Ruttungur, Allung and Koorung, which belonged to the Koly Rajah of Jowair. The same Naiks that captured Trimbuck commenced operations against Ruttungur. The Jowair Rajah and his family were at the time on this hill, but the Kolies being acquainted with one of the Mussulman jemadars of the fort, whose family was residing in one of their villages, they got him to fix the rope ladders* for them on the hill, and two hundred of them ascended to the top, but they had to fight a tough battle with the men composing the garrison, before the latter surrendered; including the loss on both sides, there were two hundred men killed and wounded. The Kolies got possession of the other forts also, and the Paishwah sent them thirty thousand rupees to pay their expenses, and Yeemajee Naik Bhauggrah, of Sakurwary was presented with a palankeen, and the village of Sakurwary was conferred in enam on him,—his descendants possess it now.

The circumstance of so many of the Koly inhabitants being either employed on the hill forts or to guard the approaches leading to them, gave the relatives of these people many opportunities of negotiating for the surrender of the forts to an enemy; for the Kolies acted frequently a very treacherous part on such emergencies. At the time of the struggle between the Mahrattas and the Mahomedans for supremacy in the Dukhun, and especially during the decline of power of the latter, and the factious and unsettled times of Raghoba Dada, it was not unusual to hear of the Kolies tendering possession of a hill fort for a bribe to a different party to that which had advanced them money to capture it, while the place continued in the hands of the Kolies; and, previous to their handing it over to the highest bidder, they carried off all the grain that was stored in the granaries.

In the year 1760, upon the occasion of the death of Heerojee Naik Baumlay of Bhoregur, one of the Koly Naiks, who retained the rank of munsubdar, which had been conferred upon one of his ancestors by the Mahomedan kings of Bedur, Jowjee Naik his son, then doing duty at Joonere, applied to the soobahdar of the province to get him nominated by the Paishwah to the situation vacated by his father, and to allow him to assume charge of the freehold lands and different emoluments that he had enjoyed. Jowjee Baumlay was of slight figure and about the middle size, with a fair complexion. He was very active and intelligent, and possessed a bold, restless and enterprising spirit; very ambitious; of irregular habits, and conniving frequently at his friends committing robberies in different parts of the country, while he was employed in the pay of government, before and after his father's death. I may add here an anecdote connected with the birth of Jowjee, as an instance of the superstition of the Hindoos, as they prognosticate much evil resulting from such and similar events.[*] It is stated that, when Jowjee was born, he came into the world reversed, or back uppermost. Such an event is reckoned not only unlucky for the infant, but likely to entail heavy misfortunes on his family. Therefore with the view of removing the evil consequence arising from such an occurrence, the customary offerings were presented to their household gods; and when the child was six months old he was taken to the banks of a river, where the roots of an oombre tree (*Ficus glomerata*) were much exposed from the water having washed away the earth. The infant was passed under one of these roots and then taken home. This ceremony is always performed on the amwass or last day of the lunar month. The fruit of this tree bears a great resemblance to the fig, and, as it is very prolific, the people draw a favourable omen from the circumstance, and hope the parents of the child may continue happy.

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* The ladders are made of the roots of the creepers *marr yelluh* and *yeotah yelluh*; these are twisted together, and at every cubit or so a piece of wood is fastened to be used as a step.

Jowjee Baumlay was not much liked by the people in authority at Joonere, especially by the family of the Sawunts, &c., and these persons pressed the soobahdar to reject Jowjee's claim; and, as he did not receive any reply to his petition, he felt much mortified and disgusted with the conduct of the soobahdar, and consequently quitted the place, and retired to his village, with the determination of busying himself with agricultural pursuits. But, after a lapse of a few years, his farming speculations proved unsuccessful, chiefly owing to his improvident habits; he consequently had no wish to discharge his dues to government. The Patell was aware of Jowjee's declaration of his inability to pay the rent of his farm; and, when the collector's sepoy came for it, the Patell told him he could not get Baumlay to send his share, and he had therefore better demand it himself. The Patell sent the village beadle along with the sepoy to Baumlay's house. The sepoy told him that, unless he paid his rent, he would be obliged to take him to Joonere. Jowjee managed to satisfy the sepoy, but he could not refrain from expressing his indignation and rage at the Patell's conduct in having sent a message by the village dhere to him; and at the sepoys having so unceremoniously threatened him. When the Patell heard of Jowjee's saying "that the Patell had insulted him," and a few days afterwards that he had quitted his house and proceeded to the jungles, he got seriously alarmed, dreading much that Jowjee would be revenged on him. He consequently proceeded to Joonere, and communicated all that had occurred to the soobahdar. It was very well known that the numerous robberies, committed in different parts of the country at this period, were chiefly perpetrated by Jowjee Naik's partisans, and the soobahdar, fearing a serious disturbance if Baumlay was allowed to remain in the jungles, deputed three Naiks for the purpose of explaining matters to him, and to prevail on him to return to his duty at Joonere. He was reluctantly persuaded to adopt their advice, and to accompany them. Jowjee was much thwarted in his expectations at Joonere, and became greatly discontented. A year had scarcely elapsed when the Sawunts, Sindhys, &c. communicated privately to the soobahdar their opinion of Baumlay, stating that he was an unsettled, intriguing and dangerous person, and that his dependants committed all the robberies that took place; and the only effectual mode of checking such irregularities, would be to destroy the root of the evil, and this could be executed in no other way than by imprisoning Jowjee Baumlay, and making an example of him. If instead of this they advanced him in the service and invested him with the title of munsubdar and conferred lands on him in freehold, that he would be rendered all-powerful, and the result would be that he would not rest, till he succeeded in destroying all those who discharged their duty with fidelity to government, and opposed his advancement. The soobahdar, perplexed and undetermined as to the measures to be pursued towards such a very untractable and insubordinate character, was waited on by four staunch friends (one of them a Brahmun) of Jowjee's, who had become acquainted with the advice his enemies had been instilling into the soobahdar's ears. These men pledged themselves in the most solemn manner as securities for his good behaviour, entreating that his life might not be endangered on account of the false accusations of his jealous enemies.

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[*] A person that has come into the world feet foremost, is considered to be very unlucky, and in imminent danger of losing his life by lightning, and in consequence shows great symptoms of alarm during a thunder storm. Rings, made of the metal of old guns and of nails used in fastening the timbers of boats, are supposed to possess some counteracting inflence, and are worn by such persons on their arms above the elbow joint, and on their toes. The Mahomedans in India, as well as the Hindoos, have a firm belief in such things. The Kolies throw their iron crow-bar outside the door of the house during a thunder storm, to prevent the house being struck by the lightning.

About this time two of the soobahdar's officers (Brahmuns) were preparing to proceed to join the Paishwah's army in the Konkan, when they were waited on by a Brahmun who had a great antipathy to Jowjee and had been plotting his destruction; he informed these two men in confidence what his plans were, and requested them to communicate them to the Beenywalla, or quarter master general of the Mahratta army, who would finally arrange matters; he further mentioned that he intended to follow in a few days, and that he would contrive to bring Baumlay with him. It so happened one day that when one of the Joonere officers was settling, with the Beenywalla (also a Brahmun), the manner in which it would be most advisable to dispose of Baumlay, one of Jowjee's emissaries overheard the consultation, and immediately proceeded with all speed to communicate to him the danger impending over him, and convinced him that their object was to deceive him, when they pressed him to join the army with his Kolies, as they would greatly aid in recapturing some of their forts; but that their real intentions were for his destruction, as they had determined to persuade him and his Kolies that their services would be required in the attack of the Seeddie of Junjeera; and, under this pretext, they were to embark Jowjee and his friends, and when the vessel was out some distance at sea they were to sink her. The instant Jowjee learnt the particulars of this plot against his life, he fled again to the jungles (Raanburry), being satisfied that, if he continued longer at Joonere, he would be assassinated. Therefore to protect himself against the attacks of his enemies, and to force the government to comply with his wishes, he began to assemble his followers for the purpose of levying contributions from the inhabitants and to plunder travellers, &c. When the Joonere soobahdar heard this, he lost no time in detaching a party of Sibundees to seize his family, which they succeeded in doing, and brought them to Joonere, where they were placed in confinement. The troops in pursuit of Jowjee pressed him closely, and rather than exasperate the soobahdar too much, and thinking it might be of service to his family were he to remain quiet for some time, he quitted the district and went to Candeish. When a considerable length of time had elapsed, he determined to send some of his kinsmen to the Joonere jungles, to gain some intelligence of his family; accordingly seven Kolies set out secretly for their homes to pick up information for their Naik, and learn something regarding their own families. In this party there were two brothers of Jowjee, Dadajee and Soorajee Baumlay, also a cousin. The seven friends had arrived within a few koss of Joonere, when they unluckily encountered Rowjee Sawunt, who had been employed with a detachment to capture Jowjee Baumlay, and was consequently moving about the country at the time. Sawunt seized the seven Kolies, and sent them prisoners to Joonere. The people in authority, wishing to separate the brothers, Soorajee Baumlay was imprisoned in Herst, and Dadajee, and the other five Kolies, in the fort of Chaound. When Jowjee was informed of his friends having been seized and thrown into prison, he immediately advanced to the banks of the Moull river in the Kotool district, where he remained concealed; but exerted his best endeavours to rouse his friends to use their influence to obtain the release of his family, and those that had been seized by Sawunt. As Jowjee was persecuted by the Sawunt family, he watched every opportunity of striking a blow at either of the brothers, for he had latterly discovered that the Sawunts were urging the soobahdar to put his own brothers, who were confined in the hill forts, to death; otherwise that they would contrive to effect their escape. The soobahdar at length gave his consent to the Koly prisoners being tied up in leather bags and thrown over the most precipitous part of the hill; the order was punctually carried into execution, except in the case of Soorajee Baumlay and his cousin, both of whom stated to those appointed to superintend their execution, that they were soldiers, and solicited, with the most earnest importunity, that they might not be tied up in leather bags. They asked that swords might be presented to each of them, and that, after they had excited themselves some time by fencing, they would leap over the precipice of their own accord. The demand could not, they were told, be complied with, as it was uncertain what persons placed in such desperate circumstances as they were, would be tempted to do, were they armed with swords. However they were supplied with two sticks, and the poor fellows amused themselves playing at single stick until their blood became heated, and the one sprung down the tremendous precipice after the other and were dashed to pieces. This was most distressing intelligence for Jowjee, and it was some time before he recovered from the grief and melancholy which overwhelmed him. His great friends Dewjee Bhauggrah and Dharrow Sablah consoled him with the hope of their getting his family restored. They accordingly went to Joonere, and became securities for Jowjee's family, and had them set at liberty; both of these Koly Naiks engaged to prevail on Jowjee to return to his duty at Joonere, but, owing to the impatience of the authorities there, and Jowjee's being much exasperated and having no confidence in their faith, there was little prospect of his remaining quiet. It was discovered that Jowjee was in the habit of frequently visiting Dewjee Bhauggrah, and the Joonere people sent a party of horsemen to watch his movements, and if possible to capture him, but the horsemen failed in their attempt, seized Bhauggrah and took him a prisoner to Joonere. Jowjee was now on the alert again, and having assembled some of his followers, moved in the direction of Kullumbaie, where he learnt that one of the Sawunts had erected a small wooden building on the boundary between Pakry and Kullumbaie, where he was occupied with a celebrated Goossyne in rendering himself invulnerable to the infliction of wounds by means of incantations. Jowjee was determined to avail himself of the circumstance, and instantly repaired to the spot, and attacked Sawunt and the Goossyne and put them both to death. Rajah Sawunt more enraged than ever with Baumlay, when he heard of his brother's death, went immediately to Poona, and represented at court the disturbed state of the Joonere district, and declared that there would be no peace while Jowjee Baumlay remained at large. This induced the Poona government to place between five and six hundred men at Rajah Sawunt's disposal, for the purpose of apprehending Baumlay. When Rajah Sawunt reached Joonere and commenced operations against Jowjee, the latter retired to some distance, and he then informed his followers that the most prudent plan would be for them to disperse while Sawunt could employ so many men in pursuit of them. They consequently separated for the time, and Jowjee retained twelve of his most active, tried, and confidential friends with him. With these he secretly resolved on striking a deadly blow at Rajah Sawunt. He got his friends and emissaries to spread such reports through the country as suited his purpose. One day it was rumoured he had been seen with a large body of followers; another day that he had gone to a distance to escape the enmity of the Sawunt; and, on another occasion, it was said that Jowjee's spirit was broken, and that he was going about asking for protection from any friend that would grant him an asylum. Rajah Sawunt divided his force into several detachments, and they frequently scoured the jungles that were Jowjee's usual haunts. On these occasions they adopted for some time every customary precaution to prevent surprise at night. Rajah Sawunt was encamped on the Ombygown Puthar, and by all accounts his sentries were very vigilant; notwithstanding this, Jowjee had the ground reconnoitred, and ascertained the spot Sawunt occupied, and at midnight he advanced to the place where he slept and instantly secured him. The troops were panic-struck and hid themselves among the bushes and in ravines. Although Rajah Sawunt had no reason to hope for pity or sympathy from his enemy, yet the spirit of parental love roused him in his distressed situation to beg and implore of him to spare his son's life, as he was a boy only twelve years old. The terrified lad had concealed himself in a bush, but Jowjee spared the life of neither. Both were put to death, with several of Sawunt's men who came in the dark to his assistance. The first intimation Sawunt's family had of this distressing adventure, was the following day, by the arrival of Rajah Sawunt's fine grey mare, which came galloping home covered with blood and without her tail. Baumlay, much delighted with his success, retreated to the fastnesses of the Hurrychunder hill fort. This exploit raised him much in the estimation of the Kolies.

After Rajah Sawunt was killed, his eldest son went to Poona to urge government to carry on more vigorous measures for the apprehension of Jowjee Baumlay, and to suppress the disturbances among the Kolies. To prove how desirous the court at Poona was to punish the rebels, young Sawunt had the rank of soobahdar conferred on him, and he was placed in charge of the Joonere district. He proceeded with reinforcements to take charge of his office, but the accounts of his sudden elevation excited the envy of some of his kinsmen. One of his cousins could not control himself on the occasion, and preferred joining [illegible]lay to acting a subordinate part under his relative. This man communicated the state of affairs to Jowjee, and mentioned that Sawunt had arrived at Joonere, but, as the day was not propitious for him to return to his own house, he was putting up with a friend. Jowjee, always on the *qui vive*, repaired in the evening with seven of his men to the vicinity of the house, occupied by Sawunt. They saw him looking on at a procession that was passing near him; they watched a convenient moment, rushed upon him and killed him.

Some time previous to this, he met a man who was in the confidence of Raghobah Dada; Jowjee persuaded him to represent to Raghobah Dada that he could be of great service to his interests among the hills, if His Highness would only issue his orders to him.

About this time Nana Phurnavees was very anxious to get Jowjee Baumlay apprehended; he sent for the mokassdar of Joonere, Dadjee Kokata, and explained his wishes to him, adding that, as he was one of the pensioners of government, it was a part of his duty to aid in preserving peace in the country. Dadjee expressed his readiness to afford such assistance as he could, but said that, to enable him to succeed against such an enterprising and influential person as Baumlay, the government must furnish him with two orders. The first must be to call on him to exert his influence with his Koly kinsmen to restore order in the country, and authorising him to offer any of the discontented Naiks to get their affairs adjusted at Poona, and that he had sufficient interest to obtain service for them, provided their claims should appear satisfactory. The second was an order, authorising him to destroy Jowjee Baumlay if he could in any way contrive to entrap him. Kokata was furnished with the necessary documents to assist him in executing the villanous plot he had in contemplation. A few days afterwards Kokata and his three sons accidentally encountered Jowjee Baumlay with a few followers in the jungle of Muddossy in the Ghorenahir; it occurred to Kokata to try to gain Jowjee's confidence, and he accordingly joined him; both he and his sons talked in a grumbling disaffected manner to Baumlay's people, and seemed to sympathise with them, regretting that none of Jowjee's friends had shown more zeal in his behalf in petitioning government to investigate the subject of his grievances. When they had been sitting some time conversing together, Baumlay proposed going to the river to bathe. Kokata took off his clothes and hung his jholna (bag used by natives for keeping beetle, &c.) on the branch of a tree, as there were no persons near the spot but some of Baumlay's men. One of these from curiosity peeped into the jholna, in which he saw some papers having the impression of the government seal; he took one of them out, and as Jowjee's man of business, a Mahratta, besides his cousin Black Baumlay, were near, they read the paper and discovered that it was the order authorising Kokata to put Baumlay to death. They replaced the paper in the bag, and availed themselves of the first opportunity of communicating to Jowjee the very fortunate discovery they had made. Jowjee, in his usual firm and decided manner said, "very well, this information confirms me in the suspicion I had of these villains. We shall easily forestall them by treating them in the manner they intended to treat us." When they were asleep at night the father and three sons were put to death.

When a few weeks had elapsed Raghobah Dada sent Jowjee Baumlay letters, desiring him to capture the hill forts, and prove his zeal and capability of serving the sirkar. Jowjee had for a long time been ambitious of carrying on operations on an extended scale, but he wanted to be patronised by some person in authority to justify the Kolies in joining him. Raghobah Dada's orders were therefore hailed with joy by these people. We have the names of twenty-one Naiks who joined Jowjee with their adherents. They lost no time in descending into the Konkan, and captured the hill fort of Sidghur. The commandant of the fort had a fine gold bangle, which Jowjee deprived him of and placed on his own wrist. The fort of Bhyreghur was attacked and captured in a few days, and the fort of Kotla was also soon mastered by Jowjee; just as Kotla had surrendered, a detachment from Joonere descended the ghauts to raise the siege. Jowjee with his usual activity advanced on this detachment, attacked and put it almost immediately to flight. He had captured the fort of Gorekha, when he was informed by one of his staunch friends that Dewjee Sawunt had engaged eight Berrdurs (men who resemble the Ramoossies) to put him to death, that he made a promise of rewarding these men handsomely if they accomplished the object for which they were engaged, and, to excite their cupidity, and as an earnest of his intentions, he presented each of them with an ornamental gold ring. Jowjee's vigilance, and the zeal and fidelity of his followers, prevented the assassins succeeding in their attempt on his life.

Jowjee having been so very successful below in the Konkan, determined on trying what he could effect above the ghauts. He surrounded the fort of Ruttunghur, and, having threatened the havildar Govindrow Khary, he offered him, through a friend, six thousand rupees, if he would surrender the place—the garrison got alarmed and the gates were opened for Jowjee's men. Allung was captured and Muddungur surrendered. Nana Phurnavees, who was supreme at Poona, vowed vengeance against Baumlay, and declared he would have him blown from a gun the instant he was caught. A detachment from Poona arrived to retake the forts; Jowjee was in the Konkan at the time, but ascended the ghauts and commenced skirmishing with the Poona detachment which suffered some loss. Another detachment advanced from the Konkan, commanded by Ghorebollay, and Jowjee skirmished with it while advancing. As Jowjee was now getting surrounded by the government troops, he informed Dada Saheb (Raghobah) that he had captured a number of the forts, but, as the Poona government had sent troops to retake them, he hoped he would receive some orders and assistance from him; all he received were letters from Dada Saheb, extolling his services and exhorting him to continue active and zealous in this cause. He sent a few things to present to those who had been most active and useful in assisting him; he added that the English had abandoned their original plans, but he did not mind this; and finished by telling Jowjee not to despair. As Jowjee had greatly excited Nana Phurnavees' wrath against him on account of his having favoured Raghobah's cause, he was now anxious to secure the friendship of some persons of rank and influence to protect him from the minister's vengeance. Jowjee was on this account more desirous of holding the forts, until he could obtain safe and secure terms for himself and his followers. He sent two of his friends to Dhondoo Mhadeo, the agent of the soobahdar of Nassik, who was his most intimate friend, to ask his advice and assistance, and Bhauggrah the Patell of Mullarpoor, a great friend of his, was applied to on this occasion, as Bhauggrah was a horseman in Tookajee Holkur's army, and a favourite of Holkur. In the mean time Ghorebollay was exerting himself to seize Baumlay and capture the forts. On one occasion Jowjee was seen ascending the Ruttunghur fort, and Ghorebollay ordered all his men to advance round the hill to stop all communication with the fort, and to prevent any person escaping. Some time after it became dark, Jowjee descended the hill by himself, and, notwithstanding every precaution that had been taken, he proceeded to join some of his friends on an adjoining hill; and Ghorebollay, to his great astonishment, heard two days afterwards that Jowjee had gone off to the northward, levying contributions, and plundering and burning the villages that refused him supplies. Ghorebollay was in the habit of severely chastising the Kolies, for not showing greater zeal and activity in aiding the troops, and not making known to him where Jowjee and his rebels were in the habit of concealing themselves. When Jowjee and his followers were moving along the summits of a high range of hills at some distance, the people occasionally ventured to point them out to the troops. It appearing doubtful whether Ghorebollay would succeed in recovering the hill forts, or in capturing Jowjee Baumlay, government gave their assent to settling the Koly disturbance by negotiating with Baumlay for the surrender of the forts. Dhondoo Mhadeo sent a confidential message to Jowjee, recommending him to continue quiet, and if possible to join Tookajee Holkur's army, and in the meantime he would not forget his interests; that he must surrender the forts to him and that this would enable him to obtain favourable terms hereafter, but that he durst not mention the home of Baumlay to Nana Phurnavees at present, as he seemed fully resolved on punishing all the rebels but particularly himself. Jowjee made up his mind to follow Dhondoo Mhadeo's advice; he joined Holkur, who readily promised to speak to Nava Phurnavees in his behalf, which he did, and suggested that Jowjee should be directed to assemble a body of Kolies and join the army before the fort of Loghur. The Kolies joined the army, and Jowjee was called upon to exert himself now in the cause of government; he had some capital rocket men, and he advanced one of these to a favourable position, and pointed out to him the direction in which he was to fire his rocket. Most fortunately one of the rockets fell among some powder, near the door of the magazine on the hill, which caused an awful explosion, and obliged the garrison to surrender. Jowjee was so delighted with the rocket man's conduct, that he took his bangle off his own wrist and placed it on the others.

Holkur, it is supposed, had been in the habit of secretly providing Baumlay with ammunition and stores, to give him a better opportunity of annoying the government; this was to serve his own aims at the time. When Holkur quitted Poona for Hindoostan, Jowjee accompanied him to Chandoor, where he remained till Dhondoo Mhadeo had obtained an act of oblivion for him from Nana Phurnavees. It was represented to government that the best policy it could adopt, would be to conciliate Jowjee and retain him in the interest of government, by giving him a permanent appointment; that it seemed a most desirable and important measure to preserve order in the hilly country, and, as no one seemed better calculated for controlling the Koly Naiks in the Rajoor districts than Jowjee Baumlay, it was ultimately determined that a new soobah should be established at Rajoor, under the designation of the Rajoor soobah; the forty villages of that district, twenty-two of Malldesh, and in the Konkan sixty villages of the Sakoorly district, twelve of the Baryajnoop, and sixteen of the Jurry Seroossy districts, constituted the new soobah. The soobahdar was to collect the revenue and pay the men employed in the hill forts, as well as the other police of the district. The revenue of the soobah was not always sufficient to cover the expenditure; four or five thousand rupees were almost annually drawn from the pergunnahs of Sinneer or Sungumnair. The soobahdar in his magisterial character had only authority to punish Kolies guilty of theft and gang robberies; but this was equivalent to the power of life and death, as the punishment inflicted was chopping off their feet or hands, and in consequence they frequently bled to death, their friends being afraid to approach, until it was too late, to afford them necessary assistance. Persons who had committed capital crimes were kept in confinement, until orders regarding the disposal of them were received from Poona; the usual punishment for such men was to blow them from a gun.

Jowjee Baumlay was nominated Naik munsubdar of the Rajoor soobah, and sixty men placed immediately under him; a portion of these had the rank of Naiks, the rest were sepoys. They did twelve month's duty for eleven month's pay; they received one or two rupees advance of pay every month, and their account was settled every six months, or once a year; one month's pay was deducted on account of durbar khureh or court expense. Jowjee had the village of Takeed, in Malldesh, worth eight hundred and fifty rupees annually, conferred on him in Jahageer, and he received additional pay yearly five hundred rupees; in all 1350 rupees from government, besides which he was presented with a bhett rupee from each village in the soobah, and also received some ghee and a small quantity of grain; when he moved about the district on duty, each village was obliged to furnish him and his followers with provisions.

Bhauggrah of Sukkurwary and Khoray of Barray, with their quota, were placed under Jowjee Baumlay's superintendence. The pay of the different grades of this police establishment was fixed and paid at the above period; it had not been altered for upwards of forty years; a few years after the British took possession of the country a very considerable reduction was made in the pay of each quota; this led to much discontent among the local Koly police, but they were restrained from showing openly their dissatisfaction, from the large number of Sibundees stationed as police guards over the country; this will be partly alluded to hereafter. It will suffice here to state, that Jowjee was drowned when crossing the Mool river near Kotool. It is said he was not very sober at the time, and it is supposed that Istah, one of the Koly Naiks, led him to a deep part of the river and then shoved him forward, when Jowjee fell off the rock into the pool, and, when he was struggling in the water, Istah, who had a dislike to him, took advantage of the circumstance, and struck him a blow on the head, which made him sink immediately; this was in July 1789. At the time Jowjee was drowned, he was proceeding to Poona, with one of the Raneehs from Jowair, whose cause he had espoused, and he entertained hopes of getting her affairs favourably settled and forwarding his own views at the same time. Jowjee was succeeded by his son Heerojee Naik.

In the year 1776 several of the Silkunda Kolies, of the village of Oottoor, had a quarrel with the Patell respecting their right to some ground in the village; and, as the Patell and district authorities refused to do them justice, they assembled a large party of their friends and others and commenced plundering the surrounding villages, and pursuing other violent measures, in the hope of obtaining redress. Troops from Poona were employed in pursuit of them, and by some lucky chance (through the management of the widow Rukmabair of Chass) these surprised the Kolies and killed and wounded many of them. The Koly leaders were consequently forced to disperse their followers. The government officers, having learnt that Suttoo Silkunda and Kokata, the two chiefs of the insurgents, were wandering about the jungles by themselves, made the villagers of the Ambygown district promise to capture the robbers. The better to ensure this, they obliged them to enter into the Sunkly zammeeny, or chain security, (one Patell going security for two or three cultivators, another respectable Patell for five or six poorer Patells, and a Desmook for a number of the Patells, &c). Silkunda and Kokata, hearing of the measures the government officers were adopting, moved off to another quarter; this was partly for their own safety, and partly to save their friends from being harassed and punished for not fulfilling their promise of apprehending them. After the troops retired from the jungles, the Kolies recommenced their operations. Several seasons were passed in this way; however when Jowjee Baumlay was settled at Rajoor he was ordered by government to prepare to proceed in pursuit of the rebels. These did not wish to come to blows with Baumlay, and it appeared to be a more prudent and politic plan to enter into some terms of accommodation with those in power, and they effected this through the aid of a Brahmun acquaintance. Circumstances compelled these Kolies to remain quiet for upwards of four years, when Sunttoo Silkunda repaired again to the jungles, in consequence of the dispute about his hereditary rights not having been adjusted.* The troops employed against the Silkunda gang this time, soon forced them to disperse, and the chiefs were induced to go in the direction of Aurungabad. They had taken an oath that they would cut off the Patell of Oottoor's head, unless government afforded them redress. Nana Phurnavees was resolved on making a severe example of these Kolies. He declared that he would not pardon them again, as they were such a treacherous race and as no faith could be reposed in them. At length one of their friends consented to betray them; this man detached a few Kolies disguised as Goossynes, who gained information respecting the place of their retreat, and a detachment that marched to apprehend them was so fortunate as to bring them all prisoners to Joonere, where the five Silkundas were executed. Bulwuntrow Beriah, brother-in-law to Nana Phurnavees, was soobahdar of the district at the time, and it is asserted Beriah became very unhappy after the execution of these men; that either from remorse or some other cause he had no peace of mind. Therefore in the hope of re-establishing the tranquillity and happiness that he had enjoyed, and of which he had been latterly deprived, he erected a temple on the banks of the river near Joonere, in which was placed as the object of worship a Punah Lingh, or five stones representing the five Silkunda Kolies who had been executed under his instructions, expecting that the sacrifices and prayers that might be offered at the shrine would tend to render him happier.

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* In adjusting boundary disputes between the Kolies during the Mahomedan supremacy, they were in the habit of making the Kolies swear on the Koran. There are some documents several hundred years old, detailing the adjustment of boundary disputes, by which some idea may be formed of the Patellships that have been sold, otherwise transferred or become extinct, &c.

No subject of quarrel is more necessary to be attended to by us than the settlement of boundary disputes and hereditary claims to dues; more especially when such occur in a hilly or jungly district. No pains ought to be spared on such occasions to ascertain the original cause of the quarrel, and all the merits of the case. The greater the number of the most respectable Patells and other persons associated in the investigation, the greater is the prospect of the disputants being satisfied with the decision, and, in the event of one of the parties being discontented, there is less chance of his adopting violent measures to gratify his revenge, aware that such a large portion of the most influential number of the community would be opposed to his wild scheme.

At the above period there was one of the females of the Silkunda family of Oottoor (Taie Silkunda) a clever, bold, and enterprising woman* who had her name enrolled as one of the police sepoys of Joonere. She never avoided her tour of duty, and when she appeared in public, she always had her bow and arrow in her hand, and a couple of well filled quivers strapped cross-wise on her back.

The circumstance of seeing the son of Jowjee Baumlay settled comfortably at Rajoor, led to some discontent and jealousy among the Koly Naiks of the district. The family of the Bhauggrah Patell of Deogowne near Rajoor at the above period (the end of the year 1798), consisted of three brothers, Govindjee, Myajee and Walloojee; they were all bold, active, and enterprising men, especially Walloojee. They availed themselves of the general feeling to assemble some Kolies, and commenced plundering in the Konkan. At the termination of a few months Govindjee Naik was seized and confined in the hill fort of Koorung; Myajee fled to a distance and shortly afterwards died, and his son Ramjee remained with the uncle Walloojee for the two seasons that he continued his marauding system. Govindjee was executed, and it was hoped this would have sufficiently intimidated Walloojee, and forced him to abandon his predatory schemes; but it had an opposite effect. Walloojee became outrageous, and increased his gang to upwards of a thousand men; with these he used to march into the Konkan, drums beating and flags flying. The inhabitants of the low country were always panic-struck when they heard that the Kolies were descending to ravage their homes. Walloojee was in the habit of dividing his gang into three or four parties, and little or no resistance was offered to his men, except those villages in which troops were stationed. On a named day they re-assembled at a particular place in the ghauts; divided the plundered property, and retired with all rapidity and secrecy to their homes. Walloojee kept a few active and trust-worthy men with himself, while he remained in retirement near Inchore; for the Jahageerdar of that place, greatly befriended him. However the Koly munsubdar, Heeroojee Naik, at length succeeded in capturing him, and, after some difficulty, brought him to Rajoor, where he was blown from a gun.

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* In 1831 at the time I was engaged superintending the operations carried on for suppressing the insurrection of the Ramoossies in the Poona collectorate. The civil authority of the district granted passports to various persons who expressed an anxiety to obtain leave to go in pursuit of the notorious Oomiah, in the hope of being able to capture him and to secure the reward tendered for his apprehension. One of the most noted of these was a widow named Luchmy Ghantighy; she was a tall, stout woman, with coarse features marked with the small pox, and of a daring and enterprising spirit. At the above period she left Poona with a detachment of Sibundees or irregular sepoys, armed with matchlock guns, and accompanied by a Brahmun accountant or man of business. Luchmy having discarded her sarhy, attired herself in a pair of trowsers, an angrika (a long jacket) and a waistband and turban. Like a native chieftain or soldier she had a sword stuck in her waistband, and her shield fastened on her back. Thus accoutred she led her heroes forth and lost little or no time in commencing operations, conformably to the good old Mahratta system of accusing and then extorting fines from suspected persons, and such as were said to favour the Ramoossy insurgents. Those who were thus oppressed by her fled to me at Sassoor to entreat for protection; Luchmy, uncertain what these complaints might lead to, repaired with her followers to Sassoor, and, by way of excusing herself, said she could not control the persons that had engaged to serve her, and who, it seemed, had unjustly levied some money from the villagers.

Shortly after the death of Jowjee Baumlay, the inhabitants of two villages in the Kotool district had a quarrel about the division of the land of a deserted village, and the appropriation of the offerings made at the shrine of the idol of the deserted place. This led ultimately to the Bheels in the neighbouring hills being called in by one of the parties; however, as some Bheels had about the year 1800 plundered some travellers, the circumstance brought on a skirmish between the Koly watchmen of Oottoor and the Bheels, in which the latter had one of their Naiks killed; the following season the Bheels* assembled in force and plundered the koly habitations around Joonere, Oottoor and Kotool. A large body of Sibundees was sent in pursuit of them, under one of the Koly Naiks, who punished them severely, and forced them to ask Heeroojee Baumlay, the Koly munsubdar, to afford them an asylum, tendering him an offering at the same time of four thousand rupees; but the government agent directed Heeroojee to attack the Bheels with his Kolies, and that he should be re-enforced by some of the men of the hill forts. The Bhauggrah Naik of Sakurwary determined to degrade or destroy Heeroojee, thinking the opportunity favourable for getting rid of him, as the Bheels were encamped only a short distance from Sakurwary. Bhauggrah prepared a feast for Baumlay, and made him partake copiously of the spirits sent round, and by talking of the exploits of their fathers, Baumlay became excited and was induced to march at night to surprise the Bheels. Bhauggrah sent to warn the Bheels of the munsubdar's approach, and he employed various means of dispersing Baumlay's force, so that at dawn there were only a few men with the munsubdar; they were all killed or wounded; Heeroojee himself fell under fourteen wounds. The Bheels restored him after his friends agreed to pay several thousand rupees as a ransom for him. The Bheels now established thannas at Kotool, Akolla and Sungumnair, as the wealth of the village of Kotool, &c. had been placed in the fort of Koonjurgur. The havildar of the fort named Sawunt wished to secure it to himself; and had, as he thought, planned a scheme that would satisfy every person, that the property had been seized and plundered by the Bheels. To serve his purpose a few of the Bheels were admitted into the fort, but these fellows outwitted Sawunt, for they instantly put him to death, and carried the valuables off with them. Troops from Poona and the Konkan, &c. were marched into the hilly country, against the Bheels, who were, after a few skirmishes, obliged to disperse in all directions; after which, offers of pardon were held out to them, and, shameful to say, the government took advantage of these treacherous means and put hundreds and hundreds of the Bheels, their women and children to death by massacrying them in cold blood, and throwing them in deep wells, &c..

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* The Bheels put in a claim about six years ago for the kukwalldarship of the Kotool district, which was of course rejected, and the hereditary Koly watchmen were re-appointed. The Bheels for many years past have been gradually encroaching and usurping from the Ramoossies and the Kolies the office of village watchmen. It would seem good policy to prevent the advance of the Bheels to the hilly country. The residence of those at present settled in the Ahmudnuggur district is confined to the open country, and as they are a more hardy and robust people than the Kolies, and partake of all kinds of animal food, were they to secure a residence in the hilly country, the probability is, that it would be a more difficult matter to quell a disturbance among them than among the Kolies.

When Walloojee Naik was executed, his nephew Ramjee Bhauggrah fled into the Konkan, and took refuge with a maternal uncle then employed at Kullian; but this man also turned a great robber, and was pursued, seized and executed, and young Ramjee ascended the ghauts and joined the Bheel insurgents. He acted a conspicuous part in all their subsequent measures; and as he continued turbulent and very troublesome, long after the Bheel disturbance was suppressed, the government officers thought it would be good policy to engage him in the interest of the state, and as he was now Patell of his village, and had become a formidable person among the Kolies, he was placed in charge of the police of a district in the Konkan, under the impression that he could check the inroads of his Koly kinsmen above the ghauts into the villages of the tract he had charge of. Bhauggrah proved himself a very able police officer. Some time after the Konkan was transferred by treaty to the British government, Bhauggrah waited upon the collector. This gentleman employed the Koly as a peon but subsequently advanced him to the situation of jemadar of police in one of the purgunnahs near the ghauts. The Koly jemadar received a bhaut rupee and a fowl annually from every village within his range. Some of them presented him with a little rice, and he was entitled to a sheep from every flock that passed through his district to the coast. A few years had only elapsed after the cession of the country, when our government issued orders prohibiting persons in the service of government receiving any presents or perquisites of office beyond their fixed salary. Unfortunately in many instances these orders interfered much in abrogating the long established usages of the country; the abolition of which if deemed necessary it would be advisable to effect in a more gradual manner. In fact the order was a distressing blow to many a man, for they considered their dignity and consequence not only seriously affected by their not being permitted to accept of that mark of respect which their predecessors and ancestors had always received, but their income was most materially affected by the prohibitory mandate. I recollect having some years ago estimated Ramjee Bhauggrah's loss on the above occasion at nearly two hundred rupees annually. The jemadar presented several petitions to the constituted authorities, begging that he might be allowed to retain the perquisites that had been withheld, as it has always been the custom of the country for persons employed as he was to receive such dues. Unluckily for him he appealed in vain, and being rather disgusted and mortified with the treatment he experienced, he asked for his discharge. There appeared to be very great objections to giving him leave to retire from the service, for he possessed great local knowledge, and was a most active and useful police officer. Six months leave of absence was very reluctantly granted to him, and he proceeded to his village; however he had no intention of returning to his duty, unless his pay was increased, or permission given to him to receive the perquisites that had been withheld. It was soon discovered that Bhauggrah's services could not conveniently be dispensed with; and a peon brought him a letter from the magistrate calling on him to return to his duty. He proceeded to the Konkan full of hope that his salary would be increased, or that he would be allowed to resume his dues; but after a lapse of many months he received no satisfactory answer to his petition. Bhauggrah became now extremely discontented, and was ready for any mischief. The better to understand subsequent events I must refer to the arrangement of affairs in the hilly country in the year 1818. In March of that year, the Koly Naiks and their followers, forming the police of the Rajoor district, were taken into the British pay, but the Koly Naik Govindrow Khary, the hereditary havildar of the hill fort of Ruttungur, a very old man, declined entering into the British service, under the pretext that he was old and superannuated; though it is well known that he refused the offer of employment under the impression that the Peshwah's government would be soon re-established. The havildar had twelve of his kinsmen (sons, brothers and nephews) employed as sepoys under him on the fort, receiving pay from government, besides various perquisites from about sixty villages presented annually. The aggregate of their yearly pecuniary allowance was 1,230 rupees; in this sum was included the revenue of the small village of Bhandurdurra, amounting to 250 rupees annually, of which place the Kharies were the hereditary tenants. Most unluckily for these poor people, the havildar's refusal of service plunged them all into great and unexpected difficulties; as they no longer received any pay, and the revenue of the village was resumed by the British authorities. The Kharies were sadly mortified, and continued in utter despair. In the course of the following year they became more embarrassed in their pecuniary affairs, as the Rajoor Koolkurnies discovered that they (the Kharies) had been plotting, and some of them were disposed to join Narrain Row Holkur's gang, who were at the time (October 1819) plundering in the Nassik district. The rapacious and overbearing Koolkurnies extorted the sum of three hundred rupees from the Kharies on this occasion, and it is worthy of notice that the last instalment of the money was not paid until March 1828. In various parts of the country there were many persons suffering much distress and inconvenience from having lost their employment in the hill forts: however, the large establishment of regular but more especially of irregular troops in the pay of government, overawed the discontented and kept them in a state of subjection. Yet, as the troops decreased in number, the conduct of many of the unemployed and displaced soldiery, and that of the predatory classes, became more conspicuous and more daring. For a series of years the persevering exertions and enterprising spirit of the Poona Ramoossies were closely and most anxiously watched by all those people, and as the efforts of the Ramoossies were ultimately crowned with considerable success, notwithstanding they were guilty of the most atrocious and violent measures during the years 1825-26, and 27, all their crimes were pardoned, as it appeared from the information before government that they could not be put down. They were consequently taken into pay and employed as the local police of the hilly country, and some lands conferred on them. The Koly population unfortunately thought they could not do better than follow the example of Oomiah and his Ramoossies. Many consultations were held by the Koly Naiks on this subject.

Jemadar Ramjee Bhauggrah and the Kharies were the chief leaders; but the Koolkurnies of Rajoor were aiding and abetting in the plot; so were the police Naiks of Rajoor (for their pay and allowances were considerably reduced under our government, which rendered them extremely discontended). It was finally determined that the Khary family should send in a petition to government, claiming a restoration to their rights and employment, either in the police of the district or on the hill fort of Ruttungur; but they were of opinion that their petition would be more readily listened to, were it known that they were in arms, and had taken up their residence in the jungles when it was forwarded. Accordingly Kassybah Khary, the youngest son of the late havildar of Ruttungur, proceeded to the hills with several of his relatives and forwarded their petition to Ahmudnuggur. Kassybah Khary was joined in a few days by jemadar Ramjee Bhauggrah, who deserted from the Konkan with two of the Koly police men; this was in the latter end of the year 1828. In January 1829, I proceeded to the western ghauts, taking with me a small detachment of the police corps; for letters had been received by the magistrate, from the mamlutdars of the Akolla district, reporting that the inhabitants had become greatly alarmed, as several hundred Kolies had assembled in the hills, for the purpose evidently of plundering them.

Although the gang was chiefly composed of the people of the district, there being nearly one, two or three persons from every village, yet, for the first two days after we had entered the hills, no satisfactory information could be obtained respecting the insurgents. The Brahmun Koolkurnies of Rajoor and some of their friends strongly recommended that the troops might not be employed, and that the leaders of the gang should be assured that, if they refrained from plundering, and remained quiet, government would make some provision for them. Those Brahmuns further asserted that, if the troops attempted to follow, they would have no chance of overtaking them; and that, if the Kolies were once fired on, they would immediately begin to plunder and burn every village they approached; that when the troops neared them, they would plunge into the ravines covered with jungle, and, at the moment they imagined they had succeeded in surrounding them, they would shortly be seen passing over the summits of some of the highest hills. In fact they had settled that the sepoys could never penetrate the tangled thickets of brushwood, or pass along the rugged and difficult footpaths* they alone travelled by.

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* They were much astonished the first time they saw a detachment of the police corps cross a range of hills by one of the most difficult tracks, and which was considered by them impassable to sepoys. The men on the above occasion were dressed every one after his own fashion, the only thing they were required to attend to was that they had abundance of ammunition, and to be careful of their muskets. This event tended much to depress the spirits of the Kolies, while the enthusiasm and confidence of the troops were proportionally increased.

As troops employed to suppress a disturbance in a hilly and jungly country, can seldom or never accomplish in a successful manner the duty they may be detached upon, unless they obtain the cordial co-operation of a portion of the inhabitants of the district, several smart and intelligent men of the police corps had been previously instructed to exert their best endeavours to gradually conciliate some of the Kolies, and to obtain from them the information we were so much in want of. These men had been frequently employed on similar duty and succeeded extremely well in the present instance.

Information on the following points was communicated to government. The number of the insurgents; the wish and hope of the population of the hilly tract that they might succeed in their object (obtaining service and additional pay from government); the strong nature of the country, and the very great advantage of acting promptly and with decision, at the same time employing an adequate and overwhelming body of troops. In the mean time little notice was taken of the Bund (the insurgents), a detachment having been merely advanced towards them for the purpose of gaining information, but with strict injunctions not to molest the Kolies, and not to mind any threatening messages sent by them. A proclamation was sent to the leaders of the Bund, telling them to disperse their followers and to present a petition to government respecting any grievances they had to complain of; but that no letters or petitions from them would be attended to while they continued in arms.

The names of nearly all the persons composing the Bund were now ascertained, also that of the relatives and friends of the chiefs and other Koly Naiks, and of the villages where they resided. The names of such persons, male and female, as were likely to assist the Bund with supplies, and communicate intelligence respecting the movement of the troops, were noted down; also a description of the most noted hiding places, and of the footpaths leading over the different ranges of hills; with an account of the spots where water was procurable, in ravines or beds of nullahs, and on the tops of hills. The detachment from Bhewndy was stationed at the bottom of the passes leading into the Konkan, and the other detachments that arrived from Mallygown, Ahmudnuggur and Poona, were posted in the situations considered most desirable for them to occupy, while lightly equipped parties were selected to be employed in constantly searching the haunts and lurking places of the Kolies.

The insurgents, a few days previous to the arrival of the troops, had begun to levy contributions from the inhabitants; they also plundered at different times three small villages; but all these irregular proceedings were soon put a stop to, and it became necessary for them to separate into small parties. The few Bheels that had joined them returned to their homes, and many of the Kolies fled to a distance; therefore, to ensure the capture of the chiefs and those that remained with them, detachments, with a certain number of the inhabitants, were posted near the different tanks and pools of water in the hills. This arrangement greatly perplexed the Kolies, and, as many of the inhabitants espoused our cause very warmly, the two chiefs and upwards of eighty of their followers were captured in about two months, and marched to Ahmudnuggur. The early and successful termination of the service must be chiefly ascribed to the great zeal and unceasing exertions of all the officers and men engaged in the service, which was one of a most fatiguing and harassing nature.

One of the most enterprising characters, in the Bund of which I have just given a short account, was a Koly named Ramah Keerva. He was a stout and powerful man with an extremely fine figure and good features; of a very unsettled and daring spirit, and noted among the Kolies for excelling them all in agility. Keerva quitted the Bund when they began to be much pressed by the troops; he moved to the southward accompanied by about twenty-five men. He meditated on several occasions attacking some of the detachments when they appeared fatigued from searching the jungles. He had been for some ten or twelve years concerned in many robberies, and persuaded four or five of the Kolies who had quitted the late Bund to remain with him rather than return to their homes; they chiefly lived in some caves or recesses in the rocks, occasionally moving about the country and visiting their friends. As he had many acquaintances among the Bheels along the banks of the Pera and Godavery rivers, he sent two of his Koly friends to some of the Bheel Naiks, inviting them to join him, and to proceed on a plundering expedition into the Konkan. Early in the month of January 1830, about thirty Bheels joined Keerva, who had assembled an equal number of Kolies who were at the time in the hills south of Kotool. As the Kolies, &c. around Joonere and in the Ghorenahir quarter had been plundering both above and below the ghauts, detachments of regular troops were moving about to apprehend them. A few men of one of these detachments (of the 11th regiment), under a Naik, were encountered by Keerva's gang, at the small village of Mandwah in the hills south of Kotool; the party were called upon to ground their arms and surrender themselves prisoners; this they very properly declined doing, and were consequently attacked by the Bheels and Kolies. The sepoys occupied a very small temple, and managed to keep their assailants off for several hours, until a detachment in the vicinity came to their relief. Several of the sepoys were killed and wounded. Keerva proceeded with his gang into the Konkan, and attacked and plundered the village of Kinnoully, and afterwards divided the spoil amounting to 7,590 rupees, when they reached the ghauts, the greater portion of it having been given up to the Bheels. The Kolies separated and the Bheels returning to their homes, were pursued by a detachment of the 17th regiment N. I. under that very active and most zealous officer, the late Captain Luyken. I have omitted to mention before that that portion of the hilly tract of country lying south of Hurrisschunder, forms the western boundary of the Poona district; while that part extending northward, from the same hill fort, forms the western boundary of the Ahmudnuggur district. Troops were out now in pursuit of the Bheels, Ramoossies and Kolies who had committed depradations in the latter part of 1829, and beginning of the year 1830. Many of the officers and men employed had been out the previous season, and had consequently become well acquainted with the inhabitants and the localities of the country. All were actuated by an unusual spirit of enthusiasm, and willingly underwent the fatigue and labour of this harassing duty. Although the services and exertions of all were so great, yet it would be very unjust to the memories of the late Lieutenants Lloyd and Forbes, the former of the 11th regiment and the latter of the 13th regiment, were I not to mention that they greatly contributed to the restoration of tranquillity in the hilly country. A number of prisoners were taken to Poona and Thanna; Ramah Keerva with several other notorious leaders and their followers were brought to Ahmudnuggur, where Keerva was executed. Some years previously, detachments from the Konkan had endeavoured to capture Keerva by surrounding him in his house at night, but he invariably contrived to escape; but as the havildar commanding one of these parties was the Koly Patell of a village near Kotool, Keerva set fire to his house by which he lost property worth several hundred rupees. As I have before noticed, this practice of retaliation is a common one among the Kolies, and I had soon an opportunity of making an effort to check such a system. Two nights after Ramah Keerva was seized, the house of the man who gave the information which led to his apprehension, was burnt, with the dwellings of four other persons; two of these were extremely poor, and one of them a widow. I therefore had the loss of each person valued as nearly as possible, and allotted to the two poorer persons three times the value of the house and grain that were destroyed; and to the other three double the amount of the property consumed by the fire; and instantly circulated a proclamation offering a reward of five hundred rupees for the apprehension of the incendiary, and announced to the people, at the same time, that it became the duty of the government authorities to afford protection to persons who suffered injury in their person or property for having rendered useful service to the state.

I shall close this memoir by mentioning that the inhabitants of the Kotool and Rajoor districts showed a very great desire to aid the troops in the service on which they were employed; and while acting independently, without any of our troops near, they seized a number of the Bund and brought them prisoners to camp.

AHMUDNUGGUR, *19th July* 1836.

IV.—*Statistical Observations on the Vurragherries, or Pulney Mountains.—By* Robert Wight, M. D. *Surgeon.*

(*Communicated by the Madras Government*).

The Vurragherries or, as they are now more frequently denominated, Pulney mountains, are situated at, and partly close the opening of the valley of Dindigul, having a direction from east to west. Their length in that direction, according to Captain Ward, who surveyed and drew up an elaborate memoir* regarding them, is fifty-four miles, with a medium breadth of fifteen; their superficial area being calculated at 798¼ square miles. The plain from which they rise, as measured at Davedanaputty within a few miles of their base, is about 1,100 feet above the level of the sea, and presents, a few feet (8 to 10) under the surface, a bed of kunkur, varying, in different places where it has been penetrated in digging wells, from ten to twenty feet in thickness, overlying a bed of mouldering gneiss which crumbles into soil as soon as exposed to the air. Permamallie their highest peak, at least so far as I had an opportunity of determining, is nearly 7,000 feet above the plain, or about 8,000 above the sea, and may be estimated from a variety of measurements which I made, to rise from 1,500 to 2,000 feet above the average level of the higher range of hill villages. This point, however, I was prevented determining accurately by circumstances which I could not control. The most elevated village, or hamlet rather, I saw, that of Sembaganoor, is above 5,500, and perhaps may be about 5,600 feet above the sea—all the others appear to be on a much lower level. These hills may, according to their degree of elevation, be divided into two zones or regions; the lower characterized by the abundance of arboreous vegetation or jungle, with which it is covered; the upper by the greater predominance of herbaceous or grassy vegetation. The jungle in the upper zone is confined to patches on the sides of the hills, and in the bottoms of the deep glens, or rather gullies, by which the ridges are separated. These ridges are generally rounded on the top, with at first gently sloping sides, which gradually become steeper as they descend, and near the bottom are in many places quite precipitous. The rocks of which they are composed, so far as my observation extends, are all stratified, even to the extreme peak of Permamallie, and there the strata are nearly if not quite vertical. The principal rock composing this immense mass is gneiss, interstratified with quartz rock and traversed by veins of felspar. In many places it is seen projecting above the surface firm and unaffected by the weather, but more generally it is decayed to a considerable depth; and in such places so completely disintegrated that it is reduced to a gritty clay, the grains of quartz only, still remaining unreduced by the action of the causes that have so completely altered the other component parts. The strata generally have a dip inclining to the south-west, but varying in degree in different parts of the hills. On the terrace of Vilputty it scarcely seems to exceed 45°, while on Permamallie it is nearly 90 degrees.

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* This memoir will be published in our next number, accompanied by a map of the Hills.

The village of Poombary stands near the edge of a terrace, commanding a view, in a north or N. N. E. direction, of a valley many miles in extent, the sides and upper limit of which are bounded by precipitous rocks, presenting the appearance of having been abruptly broken by the sudden sinking of the intermediate portion. Standing on the edge of that terrace, and looking at the rocks on either side, the strata are quite conformable on both, and with a dip towards the south, of apparently not more than 15 or 20 degrees.

This valley in its outlines and general features is I think one of the most remarkable I ever saw. Its sides are nearly straight, and are perfectly parallel, united by its upper boundary, which is equally precipitous, at nearly right angles; the hollow between, presenting the same irregularity of surface that the higher grounds on either side do. That valley, or, as it may more appropriately be denominated, strath, seems very extensively cultivated, terraced fields being visible on either side of a stream by which it is traversed as far as the eye can reach.

The grassy tops of the hills are covered with a coating of very black soil, resembling peat-earth, varying in thickness from a few inches to several feet. The sub-soil, where the black prevails, is a yellowish clay, in some places of an ochre colour, but generally of a darker shade. Some that I saw was stiff and plastic, probably well fitted for making bricks, but has not yet been sufficiently tried to determine that point. Near Poombary it is light coloured, and being used in the construction of the huts, gives them a very clean and neat appearance, when viewed from a distance, which is apt to make the beholder suppose the inhabitants much more highly civilized, and more cleanly in their habits, than a nearer approach tends to confirm. The soil, about the valleys under cultivation, seems light and loamy, of a reddish brown colour, and, where well managed, produces large crops of the very few articles which the natives seem to consider worth the trouble of careful cultivation.

The productions of the higher or grassy regions are few, and for the most part of inferior quality, not however as it seems to me from the sterility of the soil, but from bad husbandry; the grain fields being every where so over-run and choaked with weeds, that it appears quite impossible for good crops to be produced. Some fields of Tennay (*Panicum italicum*) however, which I saw were excellent, whether from the ground being previously better prepared, or from its growing so strong that it choaked the weeds, I was unable to determine. Their fields of wheat, barley, and cumboo (a very inferior sort is in use), were all full of weeds, the crops thin, and the quality of the grain inferior in proportion. Garlic is the staple production, and is raised in great quantities. It is tended with much care, the fields are well ploughed and manured, and not a weed to be seen: the returns seem very great, and, judging from the size of the bulbs only, of excellent quality.

This fact is sufficient to prove the fitness of the soil for the production of grain of the first quality, if a little more care was bestowed on its culture. This they do not think it worth, because they say "we cannot sell it, and what is the use of taking so much trouble with what we have to eat ourselves." Owing to this neglect the wheat and barley are of the worst description, rice, from their own account of it, equally bad, but of it I saw none, and can form no opinion of my own.

Their cultivation, equally with that on the plains, is much influenced by the seasons, being successful or otherwise, according as they have rain. Captain Ward mentions, with due encomiums, the ingenuity with which artificial canals are conducted to irrigate their terraced fields; but these unfortunately can only be of use, so long as the streams from which they derive their supply of water continue to flow. It does not seem ever to have occurred to the constructors of these canals to form reservoirs in which to lay up a supply of water against a drought; though, so far as my unpractised eye in such matters enable me to judge, many might be formed at no great cost, and prove of the greatest value to the inhabitants. It is true, that, to form such substantial structures, might require more skill than they possess, and prove too expensive for the poverty-stricken natives; but, until some such contrivance is had recourse to, it must ever prove difficult to guard against scarcities, in a country where the deep slopes of the rock has so strong a tendency to drain off the moisture of the thin coating of soil with what it is covered. These droughts, indeed, to a greater or less extent, seem of frequent occurrence, because in all enquiries respecting the productiveness of the soil and supplies of food, the answer invariably commenced with the postulate—'if the rains are good, then we have good crops and plenty of food; if not we are not so well supplied.'

The natural productions of the country are sufficiently varied to give us reason to put a high estimate on its probable capabilities. In the course of about 15 days I collected little short of 500 species of plants, and without any attempt on my part to preserve specimens of all the plants in flower or fruit at this season; many being rejected merely because I was not in want of specimens. It did not in short occur to me at the time, which it has since, to compare the vegetable productions of these hills with the recorded ones of the country generally. This I greatly regret, as I think, were a somewhat perfect collection formed, it would be found to contain a number of species amounting to from 3¼ to 4 fifths of the whole peninsular flora, so far as we are yet acquainted with it, and to present a vast number of species peculiar to themselves. Among the European forms observed were two species of Ranunculus; two of Anemone; three of Clematis; two of Berberis; a new Parnassia; two of Drosera (sun dew); oneStellaria, and one Cerastium(chick-weed); a rose, very abundant; three or four kinds of rasps and brambles; one Potentilla; one Circæa (enchanters night shade); a tree allied to the Bilberry (Thibaudia); one Anagallis; two of Lysimachia, both allied to British species; the common dock, very abundant about the villages; and three kinds of rushes (Juncus), one very nearly allied to the common British rush. *(Juncus effusus.)* Among the truly tropical forms, a species of Magnolia, the first I believe thatha s been discovered in the peninsula, is the most interesting; the Rhododendron nobilis very abundant; a very large and handsome Ilex (holly), but without the thorny leaves of the European plant; a species of Gordonia, a tree resembling in its flowers the Camelia andtea plant; a very remarkable species of fig, with a climbing stem, bearing fruit of the size of large oranges, in clusters along the stems: besides many other interesting trees which I fear it would be tedious to mention. Four species of palms are met with on the higher regions, namely the sago palm (caryota urens), a wild areca palm, the *Bentinckia condupana*, and an alpine species of date. The grasses are very numerous, but the predominant tribe (Andropogineæ) are not those best suited for pasturage, being generally of a coarse nature and highly aromatic quality. Ferns, mosses, and lichens, abound: among which, the most conspicuous is a branching variety of the Tree-fern, (Alsophila) very common in thick jungles on moist banks of streams.

My residence was so short, and at such an unfavourable season of the year, that I am unable to speak from personal observation of their climate. The mean of 60 observations of the thermometer suspended in a house gives 63° Fahrenheit, as the mean temperature during 20 days at an elevation of 5,450 feet. From a register of this kind no very satisfactory conclusions can be drawn. Had the thermometer been suspended under a shade in the open air, the results, so far as they went, would have been more satisfactory, but unfortunately the plan was not adopted. The very unsettled state of the weather, which confined me to the house nearly ten out of the twenty days I was there, would however have rendered such a register of little use, from the limited period of observation. Captain Ward, whose longer residence on them gave him a better opportunity of observing the thermometer, does not once mention it in the course of his memoir.

The population of this extensive tract of alpine country appears, from a statement attached to the cutcherry copy of Captain Ward's memoir, to be 3,299. If that record is correct, there must have been a very rapid decline since that time: for, according to one furnished on my application, by the collector, and made up in 1836, it appears it is now reduced to 1648 souls, an unaccountable falling off in so short a period, otherwise than by emigration, as there has been no remarkable sickness or scarcity to have swept away half the population.

Those who remain, appear a robust and healthy set of people, very active, and, I dare say, capable of great exertion if excited, but, like most people similarly situated, very indolent. They appear a simple race, having few wants, and these easily supplied. The principal part of their food is the produce of their own fields, while their clothing, agricultural implements, condiments and luxuries, are procured from the low country in exchange for their garlic; hence the care bestowed on its culture. Their food consists principally of rice, wheaten cakes, barley, and barley congee. Of animal food they seldom or never partake, and very rarely of curry, not from want of inclination, they say, but from want of means to get the materials. Their clothing is very sparing, considering the rigorous climate they inhabit. It consists of a cloth wrapped round their middle, and another thrown loosely over their shoulders, or used according to circumstances as a turband. The children, like those of the plains, are perfectly naked, which must be adverse to the extension of population, since the most robust only, can be expected to sustain uninjured, such rude exposure to the rough inclemencies of the weather that occur at the change of the monsoons, and during the cold winter season, when the thermometer is said to sink within a few degrees of the freezing point, the puddles to freeze, and the grass to become covered with hoar frost.

Their huts are built of wicker work, plastered over with clay, and thatched with grass and ferns. They usually have a neat appearance outside, but are not remarkably cleanly within. The courts in front, and the streets of the villages, are frequently paved, but contaminated with accumulations of filth, too often of the most disgusting description. The spaces between the houses are usually overgrown with rank, and worse than useless, jungle, while they might be occupied either by trees that would afford health and shade, or by really useful ones, such as oranges; and, if measures are taken to ameliorate their condition, still better by some of the European fruits, such as apples and pears. Plums I believe would thrive equally well, and to these might be added coffee, as affording a produce of more intrinsic value than any of those already mentioned. I am not quite certain how far it would succeed on the higher zone, but it would unquestionably do so on the lower, and in a few years prove a valuable addition to the exports from the hills.

Their means of intercourse, not only with the plains but between the villages, are usually of the worst description; so that beasts of burden can rarely carry a load equalling that of an ordinary cooly on the plains; and the roads, bad as they are, usually deteriorate, as they approach the low country, from the ascent being steeper and more broken there than above, and the jungles thicker. To this cause much of the poverty of the people is no doubt attributable, the cost of conveying their goods to market absorbing so large a proportion of their price that but little profit can come to the sellers.

The accompanying tables, one supposes to have been prepared about 1820, but without date, the other in 1836, show, that in these 16 years the population has diminished more than a half, I believe without any other assignable cause than emigration, induced by poverty and want naturally resulting from the obstacles to improvement inherent in the character of the country itself, when not only not counteracted by artificial means, but increased by the abstraction, in the form of taxes, of the small amount of capital which finds its way there.

Believing it to be the wish of government both to preserve, and to ameliorate the condition of, this interesting portion of the population, as well as to extend the benefits which may be expected to flow from the possession of a tract of country so large and centrically situated, enjoying a climate widely different from that by which it is surrounded, and fitted thereby for the production of so many articles not indigenous to India, but the possession of which might prove of great importance: I shall take the liberty of offering a few suggestions for its improvement, the result of my observations while there, which may, if considered worthy of adoption, be the means of restoring the moiety of the population it has lost, and tend to enhance the value of the district they inhabit to the country at large.

In attempting to ameliorate the condition of the hill population, two plans suggest themselves : the first and most obvious, and the one apparently most likely to produce a speedy effect is, to relieve the people of their taxes for a given number of years, until it is supposed they will have accumulated the means of paying them without inconvenience. This, however, is not the one which presents itself to me as the best. I object to such a plan, on the ground that what was first received as a boon might afterwards be claimed as a right, giving rise to much trouble and inconvenience in the re-establishment on the part of the sircar of his original rights, and causing heavy discontent among the inhabitants; while it is probable, the money so given would be squandered in place of being employed in the manner intended. I would further object to this plan, on the ground that no part of the money, so withdrawn from the treasury, would be devoted to the improvement of the country and roads, the object, of all others, most wanted. A third objection is, that it might prove a premium to emigration from the plains, causing a further loss to the state of the labour of the emigrants in a tax-paying district. Opposed as it is, by such weighty objections, this plan cannot be entertained for a moment. The second is, to devote the revenue of the hills to their improvement, by which much good may in a few years be accomplished at a very small cost; and that drawn so imperceptibly from the general treasury, that it would not be felt; at the same time that it would give universal satisfaction to the payers, when they saw their contributions to the state applied for their personal benefit. Unless some such measure is adopted, there is much reason to fear the total depopulation of the hills by emigration alone. At present the aggregate amount of taxes raised from them is only about 3,300 rupees per annum: that sum, carefully applied, would, in a few years, repair the now almost impassable roads, establish completely the present imperfect, but very useful and much trodden, communication between Davadenaputty and Periacollum on the south, and Pulney on the north, by clearing the paths of innumerable impediments which now obstruct them, and opening freely, the very close and unhealthy jungles at the foot of the hills near the latter place. Sheds, for the accommodation of merchants and the preservation of their goods, might be erected at convenient distances along these roads, and public choultries at each of the large villages, in which they could bivouac during their stay, collect their garlic, &c. and make their bargains; and, lastly, when these more immediate wants were cared for, bunds might be built, in the most convenient situations for preserving supplies of water against droughts.

Improving the access would at the same time lower the cost of imports, and increase to the growers the value of exports, by diminishing the cost of bringing them respectively into market, while the formation of reservoirs of water would ensure more certain returns to the agriculturist. While on the hills, I had a quantity of Jumlah or Himalayan rice sown, for trial; if the experiment proves successful it may become a valuable article of export, being of good quality, which the kind now in use is said not to be. It seems further desirable to change the wheat and barley seed; that now in use having become deteriorated by long culture on the same ground. This the ryots might receive in a present, as a very small quantity of each would be sufficient to supply the whole cultivation. But it should be given on the express condition of more attention to good husbandry being bestowed on its culture than is now the practice: by which wheat fit for exportation might be grown, and would prove a great accommodation to the inhabitants of both the high and low countries.

The inhabitants, though in the extreme of poverty, are, notwithstanding, exceedingly indolent, from having no very pressing wants to stimulate them to exertion; it appears therefore indispensable, as the first step towards improving their condition, to afford them such a stimulus, by creating artificial wants. This I think may be easily accomplished by opening a few shops in some of the large villages, containing an assortment of agricultural inplements, hatchets, knives, bill-hooks, cloth, female ornaments, condiments, &c. The same necessity that now induces them to exert their ingenuity to do without things they want, but have few or no opportunities of procuring even at a high price, will stimulate them to exertion to procure the means of purchasing things daily before their eyes, and of the uses and value of which they are by no means ignorant. When they know that a few measures of good clean wheat or barley will purchase them a hatchet or a cloth, as certainly as so many heads of garlic, they will soon see the advantage of bestowing equal care on the culture of the one, as is now given to that of the other: and, when the facilities for carrying their produce to market are increased by means of improved roads, they will take care that the merchants, now in the habit of trading on the hills and fixing their own prices, give them proper value in exchange, as they can if refused take it themselves to the low country markets. It may, in the first instance, be necessary to give a premium for the establishment of shops, but this cannot be long required.

Should these suggestions be thought worthy of adoption, either wholly or in part, it may be necessary, to ensure the careful appropriation of the funds to proper objects, to order the collector or his immediate subordinate to inspect the works in progress at least twice a year, and to pay more transitory visits, at any time his other duties may call him to the neighbourhood. And should they happily prove useful in paving the way to future prosperity and increase of the population, by giving a stimulus to exertion, it may, after the first two or three years, be proper to carry any excess of revenue that results to the credit of the state: since these objects will be much better accomplished by a slow, than speedy process, which will allow time for the habits and dispositions of the people to undergo the changes necessary to enable them to keep pace with the improvement of their country. Another great improvement it appears to me would be, as already hinted, the introduction among them of the coffee plant, by which the present rank unwholesome and useless vegetation, with which their villages are choaked, would be superseded, and a substitute of great intrinsic value made to take its place. Such a proceeding was adopted a few years ago in the Kandy country by Sir E. Barnes, and has so completely succeeded, that already every cottage has its coffee inclosure, and coffee shops have become common along all the principal roads, at which it is as much the custom of coolies carrying loads to stop and drink coffee, when fatigued, as elsewhere it is their habit to partake of the pernicious contents of the toddy shop. On the upper region sugar could scarcely be expected to prove a lucrative crop, at least for some years, but it appears to me it might be tried with every hope of success on the lower valleys, and, should it succeed, would prove an article of great value.

CHANASHOOMAREE TABLE OF THE VURRAGHERRY AND KUNNANDAVAN MOUNTAINS.

	Karakat Vellalers.	Kunavar Vellalers.	Kykallers.	Vellam Chettys.	Kongu Chettys.	Tellunga Chettys.	Murrawars.	Kamplears.	Tottyars.	Wuddagars.	Osleakauren.	Vullayen.	Kavaray.	Andeys.	Artificers.	Washermen.	Barbers.	Lubbays.	Chucklers.	Pelian.	Number of castes.	Males.	Females.	Total population.	
Palatoor......... Tandygoody......	0	50	0	0	42	0	0	0	0	2	9	87	0	0	38	9	9	0	15	57	10	161	157	318	Perriacolum or Tenkurry talook.
Munnaloor........ Punnymullay.	0	72	0	39	0	0	0	0	0	0	0	0	0	0	68	1	2	0	2	40	7	114	110	224	Nullacotta talook.
Pautchoor .... .. Perryur...........	0	247	0	20	9	60	0	16	4	0	7	12	0	0	41	5	6	0	9	124	13	295	265	560	Veerapautchy.
Kawinjee...........	0	237	0	4	0	0	0	0	0	0	0	0	15	5	5	7	7	0	2	0	8	129	153	282	Ayagoody.
Poomburra including Velputty....	0	207	289	80	0	0	151	0	0	17	0	0	0	0	59	53	17	0	33	10	10	469	447	916	Jampollum.
Munnamanoor......	0	284	243	141	0	0	0	0	0	0	0	0	0	0	194	4	54	0	47	32	8	503	496	999	
	0	1097	532	284	51	60	151	16	4	19	16	99	15	5	405	79	95	0	108	263	18	1671	1628	3299	
Nachyvile..........	327	38	0	0	95	13	0	0	0	0	0	0	0	0	17	0	8	13	3	133	9	288	359	647	Anjeenad Travancore.

DASAJADDA TABLE OF THE VURRAGHERRY AND KUNNANDAVAN MOUNTAINS.

NAMES OF THE PRINCIPAL VILLAGES.	VILLAGES.					RELIGIOUS ESTABLISHMENT.			Number of ploughs.	CATTLE.						Number of Houses.	ON WHAT DISTRICT DEPENDENT.
	Principal.	Subordinate.	Ruined.	Total.		Vistnoo.	Sheven.	Sundry petty temples.		Oxen.	Cows.	Buffaloes.	Sheep and goats.				
Palatoor Tandygoody	4	1	0	5	0	2	2	25	30	52	70	71	0	0	0	117	Perriacolum or Tenkurry talook.
Munnaloor Punny mullay	4	8	0	12	0	8	0	1	25	30	50	42	0	0	0	86	Nullacotta talook.
Pautcheloor Perryur	2	4	0	6	0	3	3	18	68	137	145	112	0	0	0	119	Veerapautchy.
Kawinjee	3	0	0	3	0	0	4	0	21	84	86	0	0	0	0	68	Ayagoody.
Poomburra including Velputty.	2	4	1	6	0	0	11	51	215	431	400	52	0	0	0	235	Jampollum.
Munnamanoor	1	7	2	8	0	6	10	43	142½	285	402	55	0	0	0	211	
	16	24	3	40	0	11	30	138	501½	1019	1153	332	0	0	0	836	
Nachyvile	6	5	0	11	0	2	1	8	94	155	259	105	0	0	0	183	Anjeenad Travancore.

V.—*Further Observations regarding the Homöothermal method of Acclimating Extra-Tropical Plants within the Tropics.*—By ROBERT WIGHT, Esq. M. D. &c. &c.

It will be recollected that the Homoöthermal method of acclimating, rests on the supposition, that plants raised from seeds, sprouted under a high temperature, have their constitutions so modified as to fit them for successful culture in higher temperatures,* than if raised in the usual manner under shade. In the following remarks, I shall offer some further elucidations of the method, and propose some experiments, which will go far, I think, either to refute the argument, or to establish the plan on a firm foundation.

I have recently met with two papers bearing indirectly on the subject; to give some account of which and show their application to practice, are my reasons for now resuming its consideration. The first of these is a letter from N. B. Ward, Esq. of London, to Dr. Hooker, published in the *Companion* to the *Botanical Magazine*, vol. 1st, page 317,—"On an improved method of transporting living plants;"† the other a memoir, by Messrs. Milne, Edwards and Colin—"Sur la vegetation des Cereales sous de hautes temperatures." Mr. Ward informs us that the simple incident of burying the chrysalis of a sphynx in some moist mould, contained in a wide-mouthed glass bottle, lightly covered, led him to the discovery, that earth so situated was always equally moist by the condensation on the sides of the bottle, and return of the moisture, which evaporated during the heat of the day; and that plants, growing in mould so preserved, would live for months or years without any additional supply of water. He was thence induced to extend his experiments, and in the course of them ascertained that, so protected, the most delicate plants, and from stations enjoying the purest air, continued for years to thrive in the pre-eminently impure atmosphere of London; and that they remained nearly unaffected by change of temperature, tropical and arctic plants, so isolated, growing freely in the same case.

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* Since this paper was sent to the press, I have met with the following very apposite fact in support of the principle, and strongly corroborative of the method of acclimating, advocated in my former paper.—" I remarked that in coffee-plantations the nurseries are formed not so much by collecting together those young plants which accidentally rise under the trees that have yielded a crop, as by exposing the seeds to germination during fine days in heaps between plantain leaves. These seeds are taken out of the pulp, but yet retaining part of it adhering to them. When this seed has germinated, it is sown, and produces plants that can bear the ardour of the sun better than those that spring up in the shade in the coffee-plantations."—*Humboldt's Personal Narative, Eng. Edit.* 4, *pages* 67, 68.

The heat developed by the fermentation of the adherent pulp, seems in this case to cause the rapid germination here mentioned, and to produce the constitutional change on the plants which enables them to " resist the ardour of the sun better than those that spring up in the shade." More conclusive evidence of the truth of the principle explained could scarcely, in my opinion, be adduced.

† Republished among the "*Selections*," at the end of this Number. The British Association for the Advancement of Science has considered this subject of importance sufficient to induce them to offer a premium for experimental researches regarding it.—*Editor*.

The application of this last fact to the introduction of tropical plants into England was too evident to be long overlooked. He says, "reflecting on the causes of the failure attending such conveyance (of plants on long voyages), arising chiefly from deficiency or redundancy of water, from the spray of the sea, or from want of light in protecting them from the spray, it was of course evident that my new method offered a ready means of obviating all these difficulties, and in the beginning of June 1833, I filled two cases with ferns, grasses, &c., and sent them to Sidney." There they all arrived in safety, though the glazed cases by which they were covered were not once, or only once, opened on the voyage. "The English plants were removed, and the cases refilled at Sidney in the month of February 1834, the thermometer ranging between 90 and 100°."

"In their passage to England they encountered very varying temperatures; the thermometer fell to 20° in rounding Cape Horn, and the decks were covered a foot deep with snow. In crossing the line, the thermometer rose to 120°, and fell to 40°, on their arrival in the British channel in the beginning of November, eight months after they were enclosed. These plants were not once watered during their voyage, received no additional protection by day or by night, and were taken out at Loddiges' in the most healthy condition." Since then numerous cases of plants have been sent to various tropical countries, and others returned with equal success. It is now the practice to send annually numerous cases of plants so protected from the Calcutta botanic garden to England, the glass cases of which, are not once opened during the voyage; the only precaution required, being to place them in such a situation as to afford them the greatest quantity of light.

My object in recapitulating so much of this paper, is to show the application of it to the determination of the value of my suggestions for acclimating plants. In the hot houses of England, where the temperature is kept up to the tropical standard, the seeds of fruit and timber trees might be germinated, and the young plants sent to this country for introduction, along with others (for the sake of comparison) germinated in the usual way.

If the premises, on which my views are grounded are correct, plants so prepared should be not only endowed with the power of resisting high temperature, but should produce seeds endowed with similar properties, and become the means of greatly extending our catalogue of useful plants: nor need the use of glazed cases be confined to the introduction of extra-tropical plants; those from other tropical countries might in like manner be introduced with certainty, and without loss or accidents on the voyage, from bad weather, exposure to sea spray, changes of temperature, &c. and could be kept in safety after landing, till a favourable season arrived for transplanting them; or, should it be desirable or necessary to send them into the interior, the continued protection would be equally effective for their preservation. On this part of the subject I believe it is quite unnecessary to say more, as the application must be obvious to every one.

The cases consist of a box, the joinings of which are made water tight, to retain the moisture of the earth. To this a glazed frame is fitted, so close as just to go easily within the box. The frame ought to be about 18 inches or two feet high. The soil being then well moistened and the plants introduced, the glazed frame is fitted on, after which nothing further is required. Mr. Ward observes—"It may be as well to state once for all, that the success of my plan is in exact proportion to the admission of light to all parts of the growing plants, and to the due regulation of the humidity of the mould, wherein they grow. It is safer in all instances to give rather too little than too much water. Plants frequenting a humid soil require more water, while fleshy succulent plants are best preserved, planted in dry sand."

The French memoir has for its object the determination of a point of the highest importance to the tropical agriculturist, and one, which it is surprising has not hitherto been investigated with the care which it obviously merits, namely the highest temperature at which the more common European Cerealiæ can be cultivated with success; and, so far as it goes, is one of great value. Reasoning from insufficient data, I was led to infer, that seeds, sprouted in a high heat, would produce plants capable of successfully resisting temperature, much higher than those to which they are generally exposed in the usual course of cultivation, and that in this way extra-tropical plants might, so to speak, be tropicalized. The experiments of the French philosophers unfortunately do not bear on this point, but as it seems desirable that the result, as well as their deductions, should be known among us, I shall give a brief summary of them, and then show the points in which they appear to me defective, in the hope that the ingenious authors may be induced to repeat them, with such modifications as may tend to confirm or refute my views.

The authors, having shown, in a previous memoir, that the germination of the seeds of both monocotyledonous and dicotyledonous plants was not prevented, other circumstances being favourable, by exposure to a temperature of 112° Fahrenheit, were led to enquire whether the more common European Cerealiæ (edible corn) might not be cultivated successfully in the very warm climates. On this point they found great discrepancy of opinion between practical agriculturists equally, conversant with the history and practice of agriculture, and scientific travellers who had visited such climates: the former, maintaining their belief that they might be successfully cultivated in all hot countries; the latter, denying, from actual observation, that they would succeed generally in tropical climates. To determine this point, samples of the two principal varieties of wheat in common use in France, the *winter* and *spring* varieties, were sown side by side on the 23d April, in a piece of well prepared ground, the increasing heat of the season being then very decided. Both germinated alike, and for some time advanced equally. By and bye the heat increased, and a remarkable difference became evident; for, while the spring wheat continued erect, its stems elongating and advancing in the usual manner to ear, those of the winter wheat ceased to increase in length, began to decline from the erect position, and the short stems became hid in tufts of large leaves; in a word it remained *en herbe.* In this form they continue to vegetate vigorously, producing numerous short stems, and large succulent leaves, forming together a beautiful green plot. The spring variety arrived at maturity at the usual time; when the change in the winter wheat commenced, the heat had risen to about 66° Faht.; whence the authors infer that this variety is incapable of arriving at maturity in any country, the mean temperature of which exceeds 65° Faht. The next experiment seems strongly corroborative of this deduction. A fresh portion of spring wheat was sown in July, when the mean temperature had risen to 71 Faht., and underwent the same changes that the winter wheat sown in spring had previously done; that is the stems ceased to elongate, became oblique and depressed, and were enveloped in tufts of large leaves, simulating luxuriant pasture or turf. Hence it is further inferred, that the spring variety can only be cultivated successfully in a climate the mean temperature of which is under 71° Faht. In confirmation of these deductions from experiment, the following facts are cited from the works of Boussingault and Humboldt. The former of these travellers states that, in the whole of the zone embracing the foot of the Andes, from the level of the sea to the height of 1721 metres (nearly 6500 feet), he neither found wheat nor barley, but, immediately above, he entered a broad zone presenting abundance of thriving corn. The first of these zones has for its inferior limit a medium temperature of 25° cent. (77° Faht.), and at its superior boundary a mean heat of 18. 8 cent. (66 Faht.) : it therefore has a higher temperature than that at which the inhabitants can successfully cultivate these grains ; a result according accurately with the deductions from experiment. Humboldt remarks that the temperate region of all climates, where the mean annual heat is between 18 and 19° cent. appears the most favourable for the culture of the Cerealiæ ; that in the equinoctial part of Mexico the European Cerealiæ are not cultivated on any part of the table-land, under an elevation of 8 or 900 metres (say in round numbers 2600 and 3000 feet) ; and on the slopes of the Cordilliersas, between Vera Cruz and Acapullo, he had rarely seen that kind of cultivation commence under an elevation of 12 or 13 hundred metres. That long experience had proved to the inhabitants of Xalapa that wheat, sown about that town, vegetates vigorously, but does not shoot upwards into ear ; on which account it is cultivated as pasture and forage for cattle : but that, in the province of Guatimala, though much nearer the equator, and at a lower elevation, European corn ripens ; perhaps owing to some local cause modifying the influence of the climate. He further informs us that he has seen, in the province of Caraccas near Victoria (latitude 10° 13′), the most beautiful fields of wheat, at an elevation of from 17 to 19 hundred *feet* ; that the corn fields of the isle of Cuba (lat. 21. 58) have even a less elevation than that ; and in the Isle of France (lat. 20° 10′) wheat is cultivated almost at the level of the sea.

These last statements seem so greatly at variance with the facts previously enumerated and the deductions from them, that it is difficult to conceive how they can be reconciled, or reduced to any general principle, otherwise than by assuming that culture can produce varieties suited to different climates. Would the Victoria, Cuba, and Mauritius varieties of wheat succeed in France, if sown during the summer season, or in circumstances similar to those in which the winter and spring varieties of that country had failed ? I think they would. The cultivation of wheat in this country affords an additional proof in support of this view, and the recent presentation at the meeting of the Madras Agricultural Society of well filled ears of the Victoria variety of wheat, and also of barley and oats, all grown in a mean temperature of about 75°, confirms it; since all the European varieties of the same kinds of grain failed in France, under a mean temperature not exceeding 71 degrees.

Perhaps these differences may be more satisfactorily accounted for on the principles explained in my former paper, and even the cause of the production of varieties shown. Thus it was observed, in the course of the experiments in France, that the growth in a normal form, of all the kinds and varieties of European corn subjected to experiment, was prevented by the high temperature of July (71° F.); but that, on the heat afterwards subsiding in August (to what degree is not mentioned), they all shot out fresh erect stems, and many of them produced ears, though, owing to the advanced season of the year, none matured its crop. It was also observed that the winter wheat died down to the root in winter, but not the root itself, and on the return of spring produced a luxuriant crop, which ripened in the usual way. In India we sow in October and November to reap in February and March, (Victoria wheat is quicker, requiring only about 100 or 110 days for maturation): the mean temperature for these months is for October 82°, November 78° 9', December 76°, January 75.5, February 77° 7'. Supposing the seed sown in October, after the setting in of the rains, under a temperature of 82° (11 degrees higher than that of Paris in July), the progressive diminution of heat, during its after stages, enables it to advance uninterruptedly until the increasing heat of February brings it to maturity; whereas, if sown in December or January, when the heat is at its minimum, the result of the Paris experiment gives us every reason to suppose that the rise of temperature in February would arrest its progress, in the same way as happened in France; and there is equal reason to infer, if the failure in Xalapa is justly attributed to the heat, that the adoption of a similar modification of the method of culture would enable them to raise grain in place of merely pasture crops, and at the same time supply themselves with a variety of grain suited for successful culture in their climate. This view, which seems fully in accordance with the experience acquired in tropical climates, is at variance with some points of that obtained in temperate ones. Thus it is recorded in the memoir that winter wheat, sown in March, when the temperature was 6 degs. 5m. centigrade (about 44° Fah., a temperature too low for germination), which did not germinate till the heat had risen 3 degrees, yet continued, notwithstanding a rapidly increasing temperature, steadily to advance to maturity. These cases seem so diametrically opposed as to be inexplicable on any known principle, and can only be accounted for on the supposition that art can change the course of nature, in so far at least as is manifested in these vital operations of plants. According to the laws of vitality explained in my former communication, we might perhaps say that the winter variety requires a very high *comparative* degree of heat, to supply which it is necessary, in the first instance to increase its susceptibility for that stimulus by exposure to cold; and that the other has had its constitution so modified that the opposite condition has been established, and that it, therefore, requires to have its susceptibility diminished by previous exposure to a higher temperature than that in which it is to grow (the very change which it is the object of the Homöothermal method to produce), to prepare it for culture in a tropical climate, by rendering it so very susceptible of cold, that a slight reduction of temperature is sufficient to counteract the injurious tendency of excessive heat. According to this view it is desirable that the authors of the memoir should extend and vary their experiments, so as to determine this point, and prove the existence of the modifying principle I have supposed. This, with the experience derived from their former experiments, might now perhaps be more easily accomplished than it could have been previously. They have ascertained that winter wheat, sprouted under a temperature of 19° centigrade, and exposed to temperatures progressively increasing to 22, did not succeed; let them now sprout the same variety in a heat of 23 or 25°, and after it has ceased to grow erect, expose it to the highest summer heat of France (22), that at which all varieties of grain yet tried had failed, and see whether it will then throw out new fruitful shoots, as the others had done on the reduction of temperature; and, in the event of its perfecting its seeds, to ascertain whether they can successfully contend with such a temperature as arrested the progress of the parent stock. Until some such course as that here suggested is adopted, the experiments hitherto made can be of no value to agriculture, opposed as they are by unlimited experience in warm climates. Humboldt who had no such theory to support, and who therefore simply states the facts as either known to himself or recorded by others, writes as follows.

" The environs of La Victoria present a very remarkable aspect, with regard to agriculture. The height of the cultivated ground is from two hundred and seventy to three hundred toises above the level of the ocean, and yet we there find fields of corn mingled with plantations of sugar-canes, coffee, and plantains. Excepting the interior of the island of Cuba,* we scarcely find any where else in the equinoctial regions European corn cultivated in large quantities in so low a region. The fine fields of wheat in Mexico are between six hundred and twelve hundred toises of absolute elevation; and it is rare to see them descend to four hundred toises. We shall soon perceive, that the produce of grain augments sensibly, from high latitudes toward the equator, with the mean temperature of the climate, in comparing spots of different elevations. The success of agriculture depends on the dryness of the air; on the rains distributed among different seasons, or accumulated in one rainy season; on winds blowing constantly from the east, or bringing the cold air of the north into very low latitudes, as in the gulf of Mexico; on mists, which for whole months diminish the intensity of the solar rays; in short, on a thousand local circumstances, which have less influence on the mean temperature of the whole year, than on the distribution of the same quantity of heat among the different parts of the year. It is a striking spectacle, to see the grain of Europe cultivated from the equator as far as Lapland, in the latitude of 69°, in regions where the mean heat is from 22° to 2° in every place where the temperature of summer is above 9° or 10°. We know the minimum of heat requisite to ripen wheat, barley, and oats ; we are less certain in respect to the maximum, which these species of grain, accommodating as they are, can support. We are even ignorant of all the circumstances, which favour the culture of corn between the tropics at very small heights. La Victoria and the neighbouring village of San Matheo yield an annual produce of four thousand quintals of wheat. It is sown in the month of December, and the harvest is reaped on the seventieth or seventy-fifth day. The grain is large, white, and abounding in gluten : its pellicle is thinner and not so hard as that of the wheat of the very cold table-lands of Mexico. An acre near Victoria generally yields from three thousand to three thousand two hundred pounds weight of wheat. The average produce is consequently here, as at Buenos Ayres, three or four times as much as that of northern countries. Nearly sixteen times the quantity of the seed is reaped; while, according to Lavoisier, the surface of France yields on a mean only five or six for one; or from one thousand to twelve hundred pounds per acre. Notwithstanding this fecundity of the soil, and this happy influence of the climate, the culture of the sugar-cane is more productive in the valleys of Aragua, than that of corn.

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* The district of Quatro Villas.

" Near San Matheo we find the last fields of wheat, and the last mills with horizontal hydraulic wheels. A harvest of twenty for one was expected : and, as if the produce were but moderate, I was asked, whether corn produced more in Prussia and in Poland. It is an error that generally prevails under the tropics, to consider grain as plants which degenerate in advancing toward the equator; and to believe, that the harvests are more abundant in the northern climates. Since calculations have been made on the progress of agriculture in the different zones, and the temperatures under the influence of which corn will flourish, it has been found, that, beyond the latitude of 45° the produce of wheat is no where so considerable, as on the northern coasts of Africa, and on the table-lands of New Grenada, Peru, and Mexico. Without comparing the mean temperature of the whole year, but only the mean temperature of the season which embraces the *cycle of vegetation* of corn, we find for three months of summer, in the north of Europe, from 15° to 19° ; in Barbary, and in Egypt, from 27° to 29° ; within the tropics, between fourteen and six hundred toises of height, from 14° to 25.5° of the centigrade thermometer.

" The fine harvests of Egypt and of the kingdom of Algiers, those of the valleys of Aragua and the interior of the island of Cuba, sufficiently prove, that the *augmentation of heat is not prejudicial to the harvest of wheat and other alimentary grain,*[*] unless it is attended with an excess of drought or moisture. To this circumstance no doubt we must attribute the apparent anomalies, that are sometimes observed between the tropics, in the *inferior limit of corn.* We are astonished to see to the east of the Havanah, in the famous district of Quatro Villas, this limit descend almost to the level of the ocean ; while to the west of the Havanah, on the slope of the mountains of Mexico and Xalapa, at six hundred and seventy-seven toises of height, the luxury of vegetation is such, that wheat does not form ears.[†] At the beginning of the conquest, the corn of Europe was cultivated with success in several regions, which are now thought too hot, or too damp, for this branch of agriculture. The Spaniards recently removed to America were less accustomed to live on maize ; they still adhered to their European customs ; they did not calculate whether corn would be less profitable than coffee or cotton ; they tried seeds of every kind ; they interrogated nature with more boldness, because their reasonings were less founded on false theories. The province of Carthagena, crossed by the chain of the mountains Maria and Guamoco, produced wheat till the sixteenth century. In the province of Caraccas, this culture is very ancient among the mountainous lands of Tocuyo, Quibor, and Barquisimeto, which connect the littoral chain with the *Sierra Nevada* of Merida. It is still happily practised there, and the environs of the town of Tocuyo alone export annually more than eight thousand quintals of excellent flour."

It does not appear, from these extracts, that high temperature is such an insurmountable obstacle to the successful culture of the *Cerealiæ*, as the authors of the memoir would lead us to believe. They seem indeed to have been so captivated with the simplicity and conclusiveness of their theory, that they have disregarded many old and well known facts opposed to their conclusions. Still it is not too late ; the same ingenuity that suggested their first very simple and beautiful series of experiments, might with equal facility indicate others leading to still more important results, by showing how we may be able to subject to our control, and at will modify according to our wants, the operations of those principles of vitality, with which nature has endowed plants for the perservation of the vegetable kingdom.

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[*] This passage seems very strongly opposed to the deductions of Messrs. Edwards and Colin, but cannot be considered as invalidating their accuracy until supported by comparative statements of temperature at the time of sowing in the respective countries.

[†] Whether is this explanation of the non-production of ears, or that of Edwards, the true one ? I myself feel inclined to adopt the latter as being the more probable of the two.

Before concluding these remarks, I will briefly advert to another subject of very great importance to Indian agriculture. Humboldt states that the inhabitants of Xalapa cultivate wheat, not for its grain, because there it does not rise into ear, but for its forage and pasture. The authors of the memoir inform us, that, sown in too high a temperature, the *Cerelia* do not produce stems, and rise to flower, but remain in the form of grass *(en herbe)*, forming a beautiful rich turf, but that afterwards, on the diminution of temperature, they shoot afresh and produce grain crops. They further inform us that, in some parts of the south of France, especially in the delta of the Rhone, it is the practice to sow early barley in autumn, for their cattle in winter, and usually it gives abundance of pasture during that season, and with the requisite care afterwards, a crop of grain. Hence, they add, if it is judged advisable, we may take two crops from the same seeds, one of forage for cattle, the other of grain for man, and both of superior quality. In the Carnatic the greatest difficulty the agriculturist has to contend with, is the want of forage for his cattle during the hot season, constraining him to use cattle of very inferior quality and unequal to his work, merely because more easily fed. Might we not, by following the example of the Xalapeans and Provinceans, supply ourselves as they do with abundance of the finest pasture and hay? I think we might—and by a very simple process—so simple, I believe it will be acknowledged by all, that it ought to be carefully tried. The subject is indeed well deserving the attention of all our agricultural societies, but more especially of our own, when the want of provender is annually so severely felt by the poorer ryots. The plan that I would propose for making the trial would be to sow wheat and other grains towards the end of the monsoon in December and January. If the statements and deductions of Messrs. Milne-Edwards and Colin are correct, the resulting crop ought not in the first instance to rise to stem and ear, but should form a rich pasture, the produce of which might be cut for hay or used for grazing during the whole of the hot season, the roots all the time extending and strengthening themselves for the final effort which is to close their existence, that of producing a crop of grain during the ensuing cool season.

As first experiments often fail, from the intervention of unforeseen circumstances difficult to prevent or even to detect in the first instance, I would recommend trials to be commenced as soon as possible, and repeated monthly, or at all events during the continuance of the petty monsoon and towards the close of the year. I have now sown two small patches with wheat and barley, but feel rather uncertain about the quality of the seed; should they however germinate, I may possibly be able to estimate the probable result before the publication of this paper, in which case it will be communicated as a postscript. I am the more anxious to see this extensively tried, as success would at a moderate computation nearly double the value of land; first by the augmented return from it, and next by the means which it would afford of providing for a greatly improved breed of cattle. The improvement of our cattle is indeed daily becoming an object of greater importance, now that our internal commerce is increasing, and there is a prospect of our soon being able to bring into use the English plough, the economical employment of which, as an agricultural implement, must greatly depend on our ability to provide it with suitable draught cattle.

VI.—*On two new Genera of Rasorial Birds.*—*By* B. H. Hodgson, Esq. *British Resident in Nipal.*

If a tythe of the attention which has been bestowed on the Insessorial, had been given to the game, birds,we should not now be obliged to wade through huge tomes in which the habits and manners of the latter are wholly overlooked, and their forms most vaguely discriminated, whilst all the stress of description is laid on colours!

In the absence of any competent guidance as to the affinities of the Tetraonidæ, I cannot speak satisfactorily of the relations of the two birds, I am about to describe, both of which are distinguished by remarkable peculiarities of form and habits, giving them a very decided, but osculant character.

Order—Rasores.
Family—Tetraonidæ.
Sub-family—Perdicinæ *nobis.*
Genus—Lerwa *nobis.*

Bill shorter than the head, very strong, conspicuously arched throughout; the upper mandible greatly larger than the lower, and nearly concealing it. Nostrils small, opened subvertically towards the head, and closed in front and above by a very tumid, small, hard scale.

Intire head and base of the bill closely plumed. Plumage of the body very abundant, firm, and somewhat puffy and spinous on the croup. Wings and tail ample and strong. Wings ungradated: four first quills subequal: second, usually the longest of all. Tail 14, straight, rounded. Legs and feet rather small. Tarsi plumed below the blunt small spurs. Acrotarsus reticulo-scutellate. Lateral fore toes subequal; hind perfect; the fores pectinated to the sides.

Habitat—The Himalayan region, in the immediate vicinity of the perpetual snow. Habits, gregarious in coveys; never perches; feeds on aromatic buds and leaves, on roots, insects and seeds. Trachea simple. Intestines and cæca approaching the length in the grouse.*

Type, Perdix Lerwa nobis. Proceedings of the Zool. Society of London, September 1833. Lerwa Nivicola nobis. Affinity equal with Perdix and with Tetrao, leading from the one to the other.

Structure and size. 15 inches long by 24 in expanse of wings; bill $\frac{15}{16}$; tail 5; tarsus less 2; central toe $1\frac{6}{16}$; hind $\frac{7}{16}$; weight 1¼ to 1½ lbs. Bill to head as 15 to 22, very stout, hard and uncompressed: maxilla not much rounded on the culmen, but spreading on the sides, and so much longer and larger than the mandibula as nearly to conceal it. Tomiæ somewhat scarpt and trenchant. Nares small, opened vertically towards the head, closed in front and above by a tumid hard arched scale which is quite nude, though the thick set plumes at the base of the bill pass forward, under the scale, to the anteal point of the nostrils. Tongue somewhat fleshy, triangular, pointed and entire. Intestines 4 feet long, with cæca of ten inches each. Gizzard large, strong and dark-hued, ⅛ to ¼ of an inch thick. Bottom of œsophagus dilated and glandular, but very remote from a galline crop. Head and orbits completely clad; plumage of the body very full, strong and composed; the shafts of the feathers, very strong towards their bases, and rather suddenly attenuated, particularly on the croup, whence results that peculiarity which is so noticeable in Cebbepyrine Shrikes. A small portion of the web of each feather, next the shaft, is very strong; but beyond that limit, the web passes suddenly into very soft down; and beneath each principal plume is a smaller one composed almost wholly of down.† This relates to the interior of the plumage: for, exteriorly, it is composed and of ordinary structure; only somewhat elongated and narrowed, but without lanceolation, on the flanks.

The wings extend considerably beyond the base of the tail, or, usually, to about three inches from its tip. They are very firm, unbowed, and void of gradation in the prime quills, the 4 first of which are nearly of equal length, commonly exceeding the tertials by about ½ an inch.

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* Cervical vertebræ 13. Dorsal, 7. Superior processes of the spinal column large, ½ inch and more high. 3 false ribs. Scapula strong and flat. Cavity of the sternum, or chest and abdomen, very capacious, being 3 inches in depth, and 2 in width. Sternal crest or keel, moderate; and the sternum not much produced over the belly.

† The peculiarity adverted to is not proper to our Lerwa alone, but is by no means so conspicuous in other allied birds.

The latter, as well as the scapulars, are long and firm. The tail, like the wings, is distinguished by a strength and elongation, very unusual in the partridge tribe, and considerably surpassing the type of Francolinus. It consists of 14, broad, round-pointed plumes, freely exserted from the coverts, and considerably gradated on the sides, so that the form is round at the end; above, it is broadly convex. The legs and feet are both small in relation to the size of the bird and to its Perdicine affinities, but without absolute defect of strength. The tarsi are clad on the inner side down to the insersion of the thumb or hind digit; on the outer side, somewhat less or a little below the spur. In front, they are nearly half nude, and wholly so behind.

The acrotarsial scales are divided angularly along the mesial line, as usual; but they are smaller and less regular in shape than in most of the Gallinaceous birds, and are, properly speaking, reticulo-scutellate, not scutellate nor biscutellate. The acropodia is perfectly scaled; the fore toes, membraned as usual; the lateral toes, nearly equal; the central, not long; the hind, short but perfect, and resting distinctly on its ultimate phalanx when the leg is bent. The lateral small scales of the fore toes are free, giving the pectinated appearance of the feet in the grouse, to which genus our bird has numberless affinities, external and internal; so much so that Tetraoperdix might very well designate the new genus I have proposed for it, if that word were not somewhat unmanageable, in comparison of our Lerwa, which I have therefore preferred, native though it be. The spur on the tarsus of the males is plainly developed, but small, blunt, and uncurved, except in *very* old males which show a slight curve and acumination in the spur.

These birds have the habits and manners of Tetrao rather than of Perdix. They are gregarious in coveys, nestle and breed under jutting rocks, feed on the aromatics, seeds and insects found in the proper Himalayan region, which they never quit, and amid the glaciers of which they take impenetrable refuge when disturbed. Trees they wholly avoid; and are usually found on the flatter and quasi-heathery ledges which form steps from the snow-bound summits of Himalaya. Our splendid pheasants occupy the same sites. The Lerwas moult, I think, twice a year, in spring and autumn; but certainly in autumn, their plumage being most imperfect in August. They are splendid game, with a vigorous flight, shy, and in size and strength equal to a grouse. Their flesh is white, succulent, and possessed of a very high flavour. The sexes resemble each other, and are of nearly equal size; nor do the young differ materially, except in being of duller hue, especially on the breast and flanks, which in the old birds shine with an intense chesnut brown or ochreous red colour. The young have the bill and legs dusky red.

Colour. Black, transversely lineated with white, which is irregularly smeared, especially in summer, with a rusty or chesnut[*] tinge. Chest and flanks, intense red brown, nearly the hue of the ripe chesnut *fruit,*[*] and largely picked out on the flanks with white, forming a broad margin to each plume. Lower tail coverts paler than the flanks, and edged with black within their pale tips. Prime quills immaculate and dusky: secondaries, largely whitened towards their ends. Bill and legs, intense coral red, smeared with dusky in young and in moulting birds. Nails dusky. Iris pale brown. A white patch under the wing, next the body.

PERDICINÆ.

Genus ARBOROPHILA *nobis.*

Type. PERDIX OLIVACEA *Lathami ?*

Piora of the Nipalese. Hill partridge and painted partridge of Europeans.

ARBOROPHILA OLIVACEA *nobis.*

Bill equal to the head, or nearly so, slender; the maxilla more than half cut out by a large membranous nareal tect, in which the advanced nares are opened longitudinally, near to the cutting edge, by an elliptic lateral downward cleft. Wings short, bowed and gradated, with the 5th quill longest. Tail 14, drooped, somewhat feeble, extremely rounded and concealed by the coverts. Legs and feet large. Tarsi elevate, unspurred, nude. Toes long; exterior lateral conspicuously larger than the inner. Nails lengthened and straightened. Cheeks invested with a red skin, which is nude in the orbitar region.

Habitat—Central and lower regions of these hills, as well as most of the hilly districts of the Bengal presidency.

Habits and manners—Exclusively a forester, inhabiting the interior of deep woods, and perching as freely as a pheasant. Gregarious in coveys, breeds on the earth, feeds on the ground and on trees, eating berries, seeds and insects. Intestines and cæca longer than in Perdix, with a large powerful gizzard. Has a shrill twittering call. Is very timid and not at all pugnacious. Affinities, various; chiefly with Perdix; not determinable in the present state of Rasorial classification.[†]

Structure and size—Twelve ounces in weight, twelve inches long, by 18 to 19 in expanse. Bill 1. Tail 2¾ to 3. Tarsus 2. Central toe $1\frac{9}{16}$. Hind $\frac{7}{16}$. Bill equal to the head, remarkable for slenderness and straightness, as well as for the size, soft tect and advanced position of the nares, which are nearer to the tip of the bill than to the gape. The tect is nude and tumid, but soft and almost membranous; and it runs beneath, as well as above, the nostrils, besides limiting them before and behind. The bill and nares, in a word, bear the same relation to those of Perdix, as the bill and nares of Hemipodius do to those of Coturnix.

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[*] Chesnut, the colour of the horse, is very different from chesnut, the colour of the fruit.

[†] Two pair only of false ribs. Scapula feeble and cylindrical. Sternum produced to the articulation of hip joints: its keel, high. Cervical and dorsal vertebræ 13 and 7, as before.

The tarsi are high and strong, quite nude, as well as half the knees, and they have the acrotarsial scales of full size, with the customary zigzag division upon the mesial line. The toes, also, are large; and the outer fore is signally longer than the inner. They are membraned as usual. The nails, with the ordinary gallinaceous attributes, are yet very noticeable for size and for straightness. One of the chief characters of this bird consists in the red cheek piece, which, however, is overlaid by close small plumes, except on the orbits. The nude skin is strong and rough, but not properly papillated, not at least as in the pheasants.

The rounded and gradated wings are very similar to those of Perdix. They have the 5th prime quill longest, and the tertials equally long. The wings reach within about two inches of the end of the tail. The 2d to 6th quills, inclusive, are emarginated, high up, on the outer web; entire on the inner. The tail is drooping, and nearly or quite hid by the coverts, but it is not feeble. At the point it is much rounded. The drooping of the tail, with a certain dumpiness in the figure of the bird, give it much the aspect of a quail. The intestines are 3 to 3½ feet long, with cæca of from 4 to 5 inches in length. The gizzard is large, dark, and from ¼ to ⅜ of an inch in thickness. The bottom of the œsophagus is dilated and glandular; but there is no crop. The food consists of wild vetches, seeds, berries and insects.

Colour. It is very brilliant, and changes greatly in the progress towards maturity. The bird ordinarily figured and described is the female. The mature male, in perfect plumage, is as follows. Head and neck, superiorly, bright rusty red. Cheeks and chin immaculate black: sides and front of the neck black, picked out longitudinally with white. Ears immaculate rusty: a fainter stripe below them of the same hue but dashed with the black of the neck. A broad white gorget across the top of the breast. Breast immaculate slaty blue: flanks the same, picked out marginally by ochreous red, and showing a large longitudinal drop of white down the shafts. Centre of the belly and vent, white, dashed with rusty: rest of the bird, olive, immaculate, or shewing narrow transverse lunulæ, forwards; and round or heart-shaped blotches, backwards—both the marks being of a black colour. Undertail coverts, black with broad white tips to each plume. Scapulars, wing coverts and tertials, very largely margined with ochreous red, and the two latter, showing large globose drops of black near the end of each feather. Alar and caudal plumes, internally, dusky, and for the most part immaculate, but exhibiting a freckled aspect on the external edge by confusion of the proximate hues. The female has the top of the head and neck olive, like the back ; the bright rusty hue of those parts in the male being transferred to her throat and front of her neck. Her cheeks are, for the most part, hoary white, more or less dotted with black, sublinearly from the beak under the eye to the ears. Her breast is blue, like the males : but she has no white gorget across the top of it. A line of black dots encloses the red throat and frontal neck, passing from the eye like a zone down either side of the neck, and meeting on the top of the breast, in the situation of the male's gorget. In both sexes the bill is always black, and the orbitar skin crimson : but the legs change from fleshy blue grey with a reddish tint into deep red. The iris is brown : the nails horn colour, passing with the legs and feet, into red. The young at first resemble the female, assuming the mature plumage very gradually in the course of three moults, with transitions too tedious for my taste. But the species, in all its changes, may be instantly known from what has been above stated.

I am tempted to add to the above generic definitions, another calculated for our Hill Chikore, the Perdix Chukor of Hardwicke, but which differs materially from the type both of Perdix and of Francolinus. It has a bill stronger than either, and, with the nares, extremely resembling those of our Lerwa; but the bill is more compressed; and the Chukore is distinguished by a strength of legs far surpassing any bird of the family. It has some other peculiarities which the following character may perhaps serve to pourtray, as a new generic or subgeneric type.

Bill shorter than the head, exceedingly strong, with a large vaulted compressed maxilla, and nearly concealed mandibula. Nares subvertical, small, opened obliquely towards the head. Head plumose. Edge of the eyelids nude and red. Legs and feet very strong. Tarsi nude, sufficiently elevate, with heavy salient scales and blunt spurs. Wings not bowed, scarcely gradated, 3d quill usually longest, 1st and 2d not much less: all three narrowed towards the points; the primes emarginated on both webs. Tail longish, firm and straight, but nearly concealed by the coverts.

If the above distinctions appear worthy of notice, the genus or subgenus may be called Chacura; and the typic species Chacura pugnax.

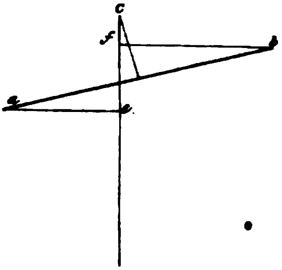
Habits, exclusively monticolous, on elevate bare, dry, stony slopes; gregarious in large coveys. Lays many eggs of a white colour, in a careless nest, after the manner of the partridges. Has a very sonorous call, and the males are famous for courage and pugnacity, being most easily tamed and shewing none of the shyness of the generality of partridges.

VII.—*Remarks upon the Plans proposed for Constructing a "Self-Registering," and an "Indestructable" Barometer.—By* T. G. Taylor, Esq. *of the Madras Observatory.*

In the January No. of the Madras Journal of Literature and Science, some attempt has been made to meet the present wants of the meteorologist, by supplying him with a barometer which promises to be "indestructable," or, in other words, one which is little liable to get out of order with ordinary rough usage; and in the same No. of the Journal, a further attempt at meteorological improvement is made, in the way of a *self-registering* barometer. That an indestructable barometer is much wanted, is a fact but too well known to every one who has used the ordinary instrument for any length of time on a march or even at a fixed residence; and the importance of a *self-registering* barometer is such, as to render any attempt at its accomplishment a matter of interest. With this view of the subject, and considering that the plans proposed for both of the above purposes are more or less true in theory, I have thought it may not be unacceptable to offer a few remarks relative to their practical utility.

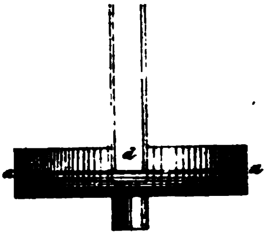
In the first place it must be noticed with regard to both of these plans, that the employment of a metallic tube is highly objectionable, by reason of the little dependence which can be placed in it, to maintain a perfect vacuum for any length of time, even for a day :—not to offer an opinion gratuitously, however, I may mention the experience of Captain Sabine, of the royal artillery. Captain Sabine, requiring an air-tight apparatus, employed Mr. Newman, the justly celebrated and careful philosophical instrument maker. Mr. Newman, fully aware that cast-iron could not be trusted, employed gun metal, and that too of three-quarters of an inch in thickness. The gun metal failed; and an air-tight apparatus was only obtained at length, by covering it on both sides with three coats of paint. In addition to this, and bearing more immediately on the point in question, I may state, that a barometer, constructed upon the "indestructable" plan, has lately been subjected to trial at the Madras Observatory. The tube was made out of a well twisted London-made gun barrel; this of itself proved unequal to exclude air, but was afterwards made tight by a coating of caoutchouc varnish—a precaution, however, which was eventually of no avail, for, on the application of fire, for the purpose of boiling the quicksilver in the tube, the leakage recommenced, so that nothing further could be done with it.

With regard to the self-registering barometer, the idea is certainly, at first sight, a very pretty one, and, but for the metallic tube, *apparently* unobjectionable. Since, however, a metallic tube is not absolutely necessary, we will take the liberty of introducing in its stead a glass one. We will suppose (as is necessary) that the whole machine is constructed in Europe, where every obstacle in the shape of workmanship vanishes; and consider for a moment the principles of the instrument. In the first place, it will be observed, that the barometer-end of the balance (if we may so term it), has to support a column of mercury of two square inches area, and two inches depth; in addition to which we have to add a tube of iron, whose weight is varying at every fluctuation of the barometer; for it must be recollected that the part immersed in the quicksilver lessens the weight imposed upon this end of the balance to the amount of the weight of an equal volume of quicksilver. Let us suppose, however, that this objection is got rid of (as indeed it can be), by a proportionate allowance in the divisions of the scale, and proceed, in the next place, to notice what takes place when the barometer rises, or when an additional weight is imposed upon the barometer-end of the balance. If the centre of gravity of balance coincides with the axis of support, it is evident that, on a rise (however small) taking place, down goes the barometer, until the lower extremity touches the bottom of the basin *c*—but if, as is usual in practice, the centre of gravity of the balance is *below* the axis of suspension, what then will be the result? If *a b* represent a balance, supported at *e*, and *c d*, a plumb line;—on imposing an additional weight at *a*, that end will descend until the product of the weight on *a* into the perpendicular *a e*, equals the product of the weight on the end *b* into *b f*. Here we see two objections to the self-registering barometer No. 1: 1st, that, in order to ascertain the amount of rise or fall, it becomes necessary by trial to adjust the axis of suspension, to such height above the centre of gravity, as shall render the scale we may have adopted correct: 2dly, that the scale, when rendered correct at the zero or any other point, will not be correct for any *other* point of indication; unless, indeed, we here again have recourse to computation, and from a table of corrections, or compute the value for each division and engrave our scale accordingly. On account of friction (which we have no very certain means of making allowance for in calculations of this sort) it is impossible to say where the centre of gravity should be placed, so that an alteration in the pressure would be read off from a scale of inches, as seems to be Dr. Gilchrist's intention; but, setting aside friction, and assuming the weight of the baro-



meter 15 pounds; it should be about two inches above the centre of gravity.

The above remarks were set down as memoranda on first reading over the papers to which they refer; but, on a second and more careful reading, an objection has offered, which will, I fear, be fatal to the balance barometer;—this I will now proceed to explain—Let *a a* represent the surface of the quicksilver, which being large with regard to the tube *b b*, we may suppose to be fixed, since we can make allowance for its fluctuations; *c c* represents the surface of the quicksilver, corresponding to any given pressure, (29 inches for instance)—Now the weight imposed upon the barometer-end of the balance, is that of the tube, and of a cylinder of quicksilver which may be imagined to surround the column *d d*, which is supported by the pressure of the atmosphere. Let us suppose the atmospheric pressure to be increased to 29, 5 inches; what now takes place? The surface *c c* rises to *e e*, and consequently an additional weight (proportional to *e e*) is imposed upon the barometer-end of the balance;—now the effect of this weight being to lower the whole tube bodily, it follows that a further rise of the surface *e e* will take place, and that, successively, cause and effect will ensue, until the entire tube is filled, or the end of the tube "brought up" by the bottom of the cistern.



The form No. 2 seems to claim attention principally from being constructed of a metallic tube. Leaving this consideration out of the question, it is by no means clear that the plan proposed is more free from objections than many which at present exist. How are we assured that a bubble of air does not exist in the quicksilver between *e* and *c*? For, allowing the stop-cock to be air-tight, still, in the course of carrying, the quicksilver in the short leg being in contact with air, and being agitated forward and back, will assuredly sometimes take up a bubble of air, and thereby render the reading erroneous.

With regard to the self-registering apparatus, it appears to be well adapted to the purpose intended; but the objections to the barometer, which it is proposed to be employed with, must be surmounted, when the self-registering barometer will no doubt be brought into general use.

VIII.—*Contributions to Indian Botany, No. 2.*—*By* ROBERT WIGHT, *Esq.* M. D., F. L. S., *&c. Member of the Imp. Acad. Naturæ Curiosorum. Surgeon on the Madras Establishment.*

DICTYOCARPUS.[*]—R. W.

MELOCHIA, *Willd.*—RIEDLEIA, *D'Cand. Prod. Syst. Nat.*—*Wight and Arnott, Prod. Fl. Ind. Orient.*—SIDA, *Roxb. Fl. Ind. Vol.* 3*d.*

Nat. Ord. MALVACEÆ.—*Linn. Syst.* MONADELPHIA DECANDRIA.

When Mr. Arnott and myself were elaborating the orders Malvaceæ and Byttneriaceæ for our work, the specimens of this plant we had to consult, were unfortunately so imperfect, as to prevent a careful analysis of the parts of fructification. We were consequently constrained to follow, without sufficient examination, the determination of the justly celebrated botanist (Willdenow) who had first described it from, we presumed, good specimens, aided by a short but precise character, from the pen of the late Dr. Klein of Tranquebar, who sent him the specimens. With these materials before him he referred the plant to the genus Melochia. Decandolle afterwards without seeing it, but guided by Willdenow's description referred it without doubt to the genus Riedleia. Roxburgh who, perhaps about the same time, or even earlier than Willdenow, examined it and had a drawing taken (which was sent with the rest of his collection of drawings to the India House), named it *Sida retusa*; afterwards, I presume from becoming acquainted with the true *Sida retusa*, he changed the specific name but retained the generic one.

Since the publication of our Prodromus, I find that Mr. Arnott has, in an article in the *Annales des Sciences Naturelles*, vol. 2d, page 230, quoted this plant as a true species of Riedleia; while he expresses a doubt as to the other species we have referred to the genus being really species of it, whether as the result of after examination does not appear. A slight examination, on my return to Madras in 1834, of recent specimens, having led me to doubt the correctness of Willdenow and ourselves in referring it to a Byttneriaceous genus, this last remark of Mr. Arnott determined me to re-examine it with care, so soon as I could procure specimens. Owing to its extreme rarity in the southern provinces, I had no opportunity of doing so until my present visit to Madras (where it is a common plant); the result is that I find it to be neither a Melochia, nor a Riedleia, nor referable to the same natural order; but that it forms a genus so very nearly allied to Sida, that might perhaps be referred to it, were it not already so overloaded with species that it is extremely difficult to unravel them.

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[*] Δικτυον *rete*, Καρπος *fructus*; in allusion to the reticulated carpels.

The essential character by which Malvaceæ are distinguished from Byttneriaceæ is their one celled anthers, usually bursting transversely across the apex. In Byttneriaceæ they are two celled and open outwardly. The first step therefore was to determine the natural Order of my plant—it is a true Malvaceæ. The next point was to ascertain whether it was really the same as the one described by Klein and Willdenow. A comparison of the accompanying figure, with the following very succinct character by Klein transmitted with the specimens to Willdenow, will, I think, leave no doubt on that head. " Calyx 5-fidus: Corolla monopetala, 5-partita, basin tubulosa: stamina 10 monadelpha: germen depressum, styli 5, longe flexuosi: capsula depressa, 5-locularis, 5 sperma: semina reticulata trigona." Roxburgh's description corresponds in every essential particular except the last ' semina (carpella) reticulata,' as he speaks of them being " pretty smooth," which does not, however, detract from his known accuracy, since it is not till near maturity that they become strongly reticulated, a state in which he might not have examined them, or he may not have observed it, as it is not till the carpels are removed from the calyx that this beautiful structure comes into view.

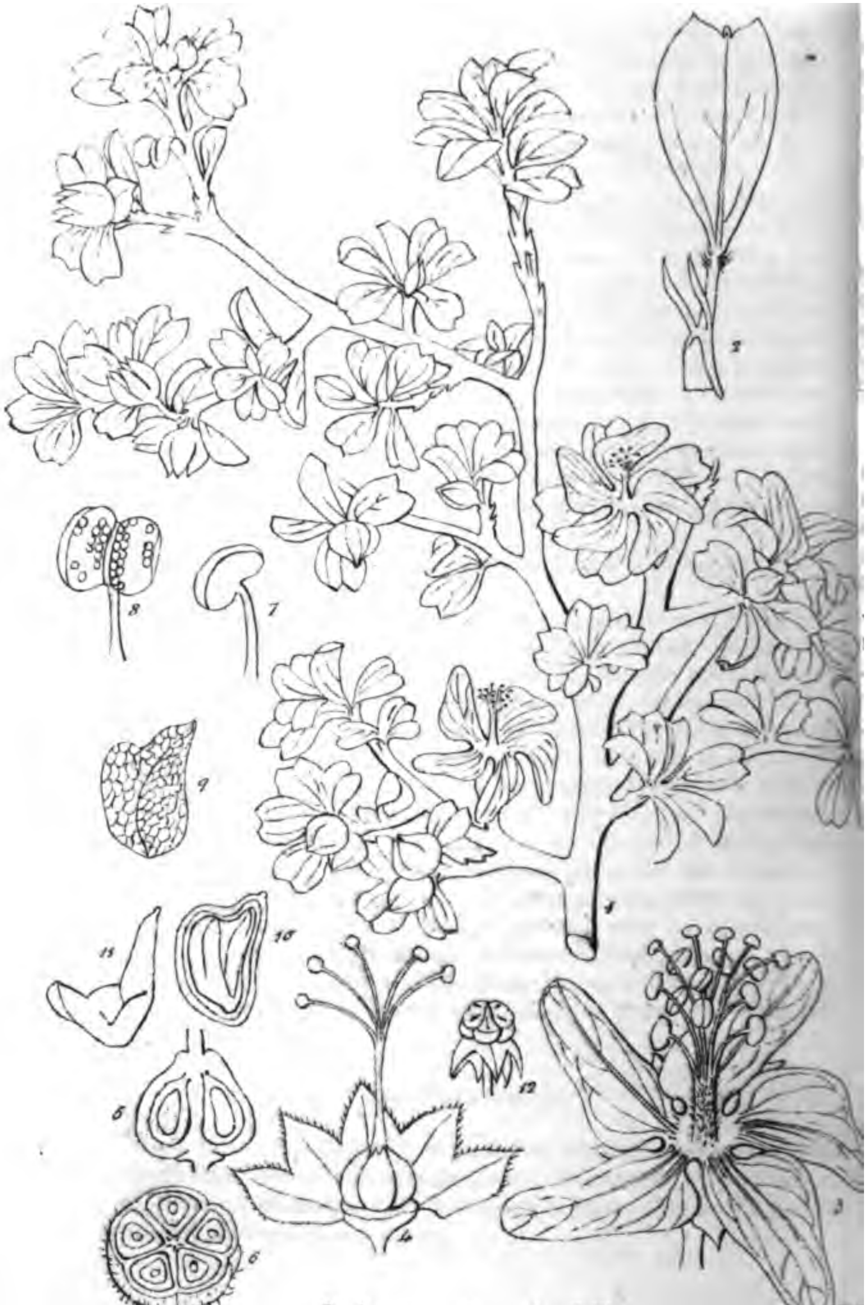
Having ascertained its identity with the plant of these authors it only remains to determine the genus.

On comparing the characters above quoted with those of the genus Sida, I find only one of any weight in which they differ. In Sida the stamens are indefinite, here they are constantly definite, twice the number of the petals. Is this a sufficient ground for its separation ?

According to the Linnean system, which attaches perhaps an undue weight to the number of stamens, it might be supposed a sufficient reason, and I have no doubt that that alone induced Willdenow to refer it to a genus with definite stamens, though with only half the number, without adverting to the great difference of structure of the anthers. According to the natural system, which pays somewhat less respect to characters taken from the number of stamens alone, other characters being alike, the grounds for separation are not quite so satisfactory; though, for the reason above stated, it seems desirable, as much as possible, to curtail that already overgrown genus, on which account I propose keeping this plant distinct, almost solely on the ground of its definite stamens.

DICTYOCARPUS.

Gen. character.—*Calyx* 5 cleft persistent, without an involucel. *Ovarium* 5 celled, with a solitary ovule in each. *Stamens* 10; *filaments* united at the base, free above. *Styles* 5. *Stigmas* capitate. *Carpels* 5, 1 seeded muticous, reticulated at maturity.



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Dictyocarpus truncatus. R.W.

A small rather rigid ramous shrub. *Leaves* truncated cuneate. *Stipules* petiolar subulate. *Flowers* solitary on the ends of the branches. *Fruit* flattened, somewhat depressed.

D. *truncatus.*—R. W.

Hab. Frequent in waste grounds about Madras.

Melochia truncata *Willd : sp.* 3. *page* 601.—*Sprengel, Syst :* 3. *p.* 29.
Riedleia truncata *De C. Prod : Syst.* 1. *p.* 491.—*Wight and Arnott*
Prod : Fl. Peninsul. Ind. Orient : vol. 1. *p.* 66.
Sida cuneifolia. *Roxb. Fl. Ind. vol.* 3*d. p.* 170. *Hort. Beng. p.* 50.
Sida retusa. *Roxb. in E. I. C. Mus. tab.* 341.

REFERENCES TO PLATE 19.

1. A branch natural size.
2. A leaf, and stipules adhering to the petiole.
3. Flower.
4. Calyx, ovary, style, and stigmas.
5. Ovary cut vertically.
6. ——— transversely.
7. Anther.
8. ——— burst, with grains of pollen.
9. Carpel separate, showing its reticulation.
10. ——— cut vertically, showing the embryo and erect radical in situ.
11. Embryo removed from the enclosing albumen, the foliaceous cotyledons drawn aside to show the radicle, which points towards the apex of the seed—all more or less magnified.
12. Carpels united into a 5-celled capsule—natural size.

NIMMOIA.—R. W.

Nat. Order SAXIFRAGEÆ.—Lin. Syst. TETRANDRIA MONOGYNIA.

Among a small collection of Bombay plants, recently communicated by Mr. Nimmo of that place, was one, the general appearance of which struck me as peculiar ; it seemed to differ from any Indian plant I had hitherto met with. This circumstance induced me to examine it with care, and I was much pleased to find it form the type of a new genus of a family nearly unknown in Southern India,* though frequent in temperate climates, and extending northwards to within a few degrees of perpetual snow.

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* Vahlia is the only known peninsular genus of this order.

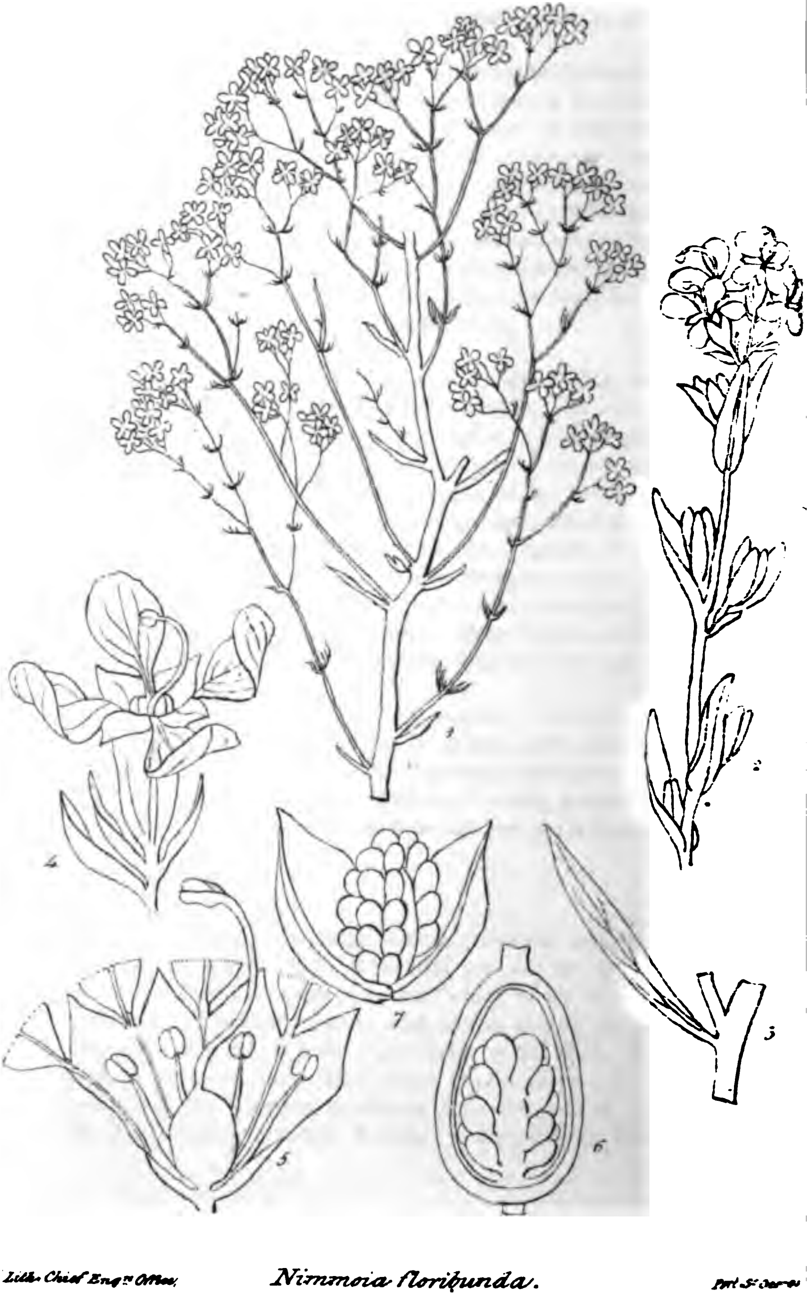
I was the more pleased with this discovery as it affords me the opportunity of commemorating in the annals of Botany the name of its finder, who has been long an assiduous investigator of the rich flora of that hitherto inadequately explored coast, and who is now the acknowleged head of the *Corps Botanique* of Bombay : a gentleman, whose diligence in collecting, is only equalled by his liberality in distributing the proceeds. With his aid, and that of Mr. Graham, already favourably known to the readers of this Journal by his catalogue of Bombay plants, I hope to have many opportunities of enriching these contributions, and enlarging the catalogue of Indian plants.

Gen. character.—*Calyx* four sepaled; *sepals* cohering, not united to the ovarium. *Petals* four, obovate entire, shortly unguiculate, attached to the top of the calyx, and alternate with its lobes. *Stamens* 4, alternate with the petals, attached to the middle of the tube of the calyx; *filaments* decurrent. *Anthers* 2 celled dehiscing longitudinally. *Ovary* free, sub-pedicellate, imperfectly 2 celled. *Ovules* numerous, attached to an erect central placenta, adhering below to the inflexed margin of the valves, free above. *Style* single, filiform. *Stigma* large, two lobed. *Capsule* free, included within the persistent calyx, 2 valved, incompletely 2 celled, dehiscing transversely across the apex, many seeded. *Seeds* small oval, testa transparent. *Embryo* central, the length of the seed, radicle pointing to the hilum.

Plant herbaceous, glabrous, very ramous. *Leaves* coriaceous, alternate, sessile, cordate at the base, lanceolate acute above, exstipulate. *Flowers* small, red, congested in numerous clusters on the ends of the branches, each bibracteate. *Calyx* and petals persistent, capsule included, dividing the base of the style into two parts during dehiscence.

N. *floribunda*. R. W.

This genus, though agreeing in every particular with the character of the order to which I have referred it, yet has not a single associate with which I can compare it, or with which it can be confounded; the quaternary division of its parts, with its free shortly pedicellate ovary, effectually separate it from every other genus of the order. Vahlia, perhaps the most nearly allied genus, has the calyx cohering with the ovary, and the placenta pendulous from the apex of the cell. Here the case is exactly reversed, the ovary is free, and the placenta erect.



Lith. Chief Engr. Office, Nimmoia floribunda. Ft. St. George

References to Plate 20.

1. Branch—natural size.
2. Branchel showing the sessile, cordate, exstipulate leaves and terminal cluster of flowers.
3. Stalk and leaf from the lower portion of the branch, showing the inferior leaves lanceolate.
4. Flower with attached leaf and 2 calycine bracts.
5. Calyx laid open to show the attachment of the stamens and petals, the pedicellate free ovary, style, and 2 cleft stigma. The limb of the petals cut off.
6. Ovary divided vertically, showing the erect placenta and numerous ascending ovules.
7. Capsule burst, valves drawn somewhat aside to the placenta and seeds—All more or less magnified.

IX.—*Notice of an Observation of the Lunar Spot Aristarchus.—By* T. G. Taylor, Esq. *of the Madras Observatory. H. E. I. C. Astronomer.*

" At seven o'clock in the evening of the 10th March 1837 I was watching the approach of the Moon's dark border to a star of the 9th magnitude, when my attention was arrested by the appearance of a nebulosity, about as bright as a star of the 6th magnitude, situated upon the Moon's disc, at about four minutes from the unenlightened edge; on referring to a chart of the Moon, the phenomenon evidently proceeded from the spot Aristarchus. I have frequently looked for this appearance during the early age of the Moon, but have never before seen any thing to compare with the brilliancy which I on this occasion witnessed."—*Extract from the Madras Observations.*

The above, it must be acknowledged, offers nothing particularly new; on the contrary, the appearance of Aristarchus as a luminous mass when the Moon is two or three days old, was noticed at least twenty years ago. This spot has always been distinguished, as being the brightest upon the Moon's surface when subjected to the influence of the sun; and, when *not* so influenced, it has at times (when the Moon was two or three days old) exhibited a more or less degree of brilliancy. To account for this phenomenon, Captain

Kater has supposed that a volcano in the act of eruption was the cause; whilst others, again, presuming on the Moon being destitute of an atmosphere, have doubted if, in the absence of oxygen, combustion could take place. It has otherwise been accounted for by supposing this part of the Moon to consist of a somewhat polished surface, and that the varieties of brilliancy were due to changes in the powers of transmission possessed by our atmosphere. However true this latter supposition may be for the variable climate of England, where the observations of this spot have chiefly been made, it cannot, with any degree of propriety, be applied to the fine months of December, January or February in this country, where an uniformity of temperature and pressure, and consequently tranquil sky almost mechanical exists.

It is somewhat remarkable that, during the last ten years, notwithstanding that observers and well constructed telescopes have very much increased in number, still there has not a single notice appeared of this phenomenon having been observed by any one. From my own experience at Madras during the last six years I can state, that on one or two occasions only have I ever *even fancied* that I could distinguish any thing particular in the appearance of this part of the Moon, although my observations for this purpose have been unremitted.

To those who entertain the idea of a volcano in the Moon, the present notice would seem to favour their supposition exactly. The volcano has been quiet during the past ten years and has now burst forth again! A little reflection, however, upon the nature of the motion of the Moon's orbit will show us, that such a supposition may be dispensed with. In the case of a highly polished plateau of land being the cause of the phenomenon in question, its reappearance might be deferred during an interval corresponding to half the period of the regression of the nodes (9¼ years)—but, conjointly with this cause, taking account of the other various disturbances to which the Moon and her orbit are subjected, it is easy to perceive that the occasional appearance and disappearance of Aristarchus may be fully accounted for.

X.—*Horary Meteorological Observations made at the Equinoxes and Solstices, agreeably with the suggestion of Sir* John Herschel.

1*st.*—*At the Madras Observatory*—By T. G. Taylor, Esq. *H. E. I. C. Astronomer.*

1837	Time.	Barometer.	Ther.	Wind.	Remarks.
Mar. 20	6 P. M.	29.840	83.4	S.	Clear gentle breeze
	7 „	.850	82.1	S.	do. do. do.
	8 „	.862	81.1	S. E.	do. do. do.
	9 „	.870	80.0	—	do. and calm
	10 „	.876	78.8	E.	do. gentle breeze
	11 „	.878	77.7	E.	do. do. do.
	12 „	.850	76.5	S.	do. do. do.
	1 A. M.	.834	76.2	S. E.	do. very do. do.
	2 „	.820	75.5	S. E.	do. do. do.
	3 „	.810	76.2	W.	Flying clouds do. do.
	4 „	.808	76.4	W.	do. haze do. do.
	5 „	.812	74.8	W.	Clear do. do.
	6 „	.822	74.2	—	Flying cds. calm
	7 „	.848	77.2	—	Clear do.
	8 „	.872	80.0	S.	do. strong breeze
	9 „	.890	82.9	S.	Flying clouds do. do.
	10 „	.896	85.8	S.	Clear do. do.
	11 „	.890	85.0	E.	do. do. do.
	12 „	.872	85.7	S. E.	do. do. do.
„ 21	1 P. M.	.840	86.0	E.	do. do. do.
	2 „	.816	86.3	E.	do. do. do.
	3 „	.788	86.3	S.	do. do. do.
	4 „	.790	86.5	S.	do. do. do.
	5 „	.792	84.5	S. E.	do. do. do.
	6 „	.830	82.4	S. E.	Clear moderate do.
	7 „	.830	81.3	S. E.	do. gentle do.
	8 „	.842	80.6	—	do. calm
	9 „	.844	79.4	—	Haze do.
	10 „	.856	78.3	S. E.	Clear moderate breeze
	11 „	.846	77.9	S.	do. gentle do.
	12 „	.830	77.8	S.	Clear do. do.
	1 A. M.	.806	76.9	S.	do. very do. do.
	2 „	.792	76.8	W. by S.	Fl. cds. and do. do.
	3 „	.770	76.0	W. by S.	do. do. do.
	4 „	.764	75.0	W. by S.	do. haze do. do.
	5 „	.770	74.3	W. by S.	Flying clouds do. do.
	6 „	.776	74.2	S. E.	Clear do. do.
	7 „	.800	76.6	S. E.	Flying clouds do. do.
	8 „	.814	79.7	S. E.	do. strong do.
	9 „	.828	83.7	S.	do. do. do.
	10 „	.836	84.9	S. E.	do. do. do.
	11 „	.820	86.2	S. E.	do. gentle do.
	12 „	.816	85.7	S. E.	Clear strong do.
„ 22	1 P. M.	.792	85.8	S.	do. & haze do. do.
	2 „	.770	85.8	S. E.	do. do. do. do.
	3 „	.756	87.0	S. E.	do. do. do. do.
	4 „	.742	86.4	S. E.	Haze do. do.
	5 „	.756	85.4	S.	do. do. do.
	6 „	.774	82.7	S.	do. do. do.

2d.—At Hoonsoor, in Mysore.—By Wm. Gilchrist, Esq. of the Madras Medical Establishment.

Day.	Hour.	Dry thermometer.	Wet bulb therm.	Barometer.	Winds.	Clouds, &c.	Remarks.
Mar. 21	6 A. M.	68	65¾	27.548	E. N. E. occasional airs.	Dense fog.	Dew.
	7	72¾	67¾	.551	Do do do rather stronger.	Fog nearly gone.	
	8	75⅓	69	.574	Do steady do do.	Zenith rather hazy, horizon much so.	
	9	80	69	.600	E. airs merely perceptible.	Do do do less do.	
	10	84	69	.628	Calm. ...	Do do do hazy	
	11	86	66¼	.626	E. N. E. occasional puffs.	Do do do do	
	12	82¼	66	.610	Do do do	Do do do rather hazy.	
	1 P. M.	91	65	.600	Do do do rather strong.	Do clear do do.	
	2	92	64¼	.560	N. E. breeze somewhat gusty.	A few detached white cumuli scattered over sky, horizon still hazy.	Cumuli rose from the W. showing an opposite upper current of air.
	3	91¾	63½	.532	S E. by E. do do do	Large dense, detached cumuli W. horz. dense white cum-strati.	Whirlwinds frequent.
	4	90½	63¾	.514	W. N. W. do.	Cumulo-strati	
	5	91¼	62¾	.520	N. E light breeze.	Zenith cirri, horz. cumulo-strati & hazy	
	6	86¼	72	.530	N. W. breeze.	Cumulo-strati.	Wind has changed frequently last hour between N. E. and N. W.
	7	81¼	71½	.520	S. W. strong breeze.	Zenith clear, horizon hazy, a few cumuli E. horizon.	
	8	78¾	71¼	.536	Do breeze.	Hemisphere hazy.	
	9	77	71	.530	Do do.	Do do.	
	10	76¾	71	.530	Do light breeze.	Do do.	
	11	76	70¾	.528	Do airs occasionally somewhat gusty.	Zenith cirri—horizon hazy.	
	12	76	70½	.540	Do do.	Overcast with cumuli.	
22	1 A. M.	74¾	70	.520	Do do.	Hazy—a few small cumuli.	
	2	73	69	.510	Do light breeze.	Do. small cumuli W. horizon.	
	3	71¼	68½	.516	Do airs.	Small cumulo-strati.	3h. 3¼m. length of shadow 6.690 inches, upright being 6 inches.
	4	71	68	.512	Calm.	Hazy.	4h. 16m. do do 14.534 do do.
	5	70	67½	.520	Do.	Do.	The longer the shadow the less distinct the termination.
	6	69½	66¾	.512	Do.	Do.	
	7	72¼	69	.520	Do.	Do.	

8		75½	68½	.528	N. W. occasional light airs.	....	Hazy.	
9		81½	70½	.550	Calm	....	Zenith cloudless, horizon hazy, a few thin cirri S. W.	
10		84	68½	.550	S. E. occasional light airs	....	Zenith a few cirri, horizon hazy	
11		87	64¾	.550	Do do do	....	Do cloudless, do do a few cirri to S.	
12		88	66¼	.550	S. S. E. light breeze occasionally gusty.		Do cirri do do	
1	P. M.	90½	65	.520	Do do do	do	Do do do do	Thermometer in sun 97½
2		90	64½	.502	Do breeze do	do	Do strati do do	
3		91½	65	.480	Do light breeze do	do	Do cirri, horizon hazy, dense white cum-strati have risen near to zenith all round	
4		90½	61	.462	E. S. E. do do	do	Do and W. quarter dense cumuli, horizon cum-strati.	
5		87	72¾	.460	S. W. breeze do	do	Sky hazy, cumulo-strati and strati	Wind very disagreeable, feels like hot steam.
6		82	71½	.470	Do do steady	....	General aspect of sky hazy, thin cirri and cumuli in various directions.	

The instruments used in making the above observations were placed at a window, having a northern aspect, uninfluenced by radiation or reflection. The dry thermometer was in July 1835 compared with the standard one then in use at the Madras Observatory, and found to be correct—the wet bulb thermometer coincided with the dry one, previously to applying a piece of gauze to the bulb.

The barometer was compared with the one in use at the Madras Observatory in July 1835 and found to indicate .042 too high. The heights of the mercurial column given above, are these as read off without any correction for the error of instrument just mentioned, or for reduction to 32° Fah. of temperature of mercury.

The shadow was determined by an apparatus fitted up for the purpose—consisting of a rod of iron pointed at top, and rising perpendicularly to the height of six inches, exactly above the plane of a piece of wood 2½ feet long by two inches broad. At each corner of the wood a screw is placed by way of foot; by which is effected the adjustment of the upper surface of the wood to the true horizontal as indicated by two levels attached to it at right angles to each other. In order to see distinctly the shadow, a piece of white paper was pasted on the upper surface of the wood, with every care to preserve a level surface. The termination of the shadow was pricked off at the respective times of observation, and the length between the mark and the semi-diameter of the wire was measured with the detached scale of a barometer the vernier of which read off to 1-500th of an inch.

Hoonsoor is W. 13° South of Seringapatam, distant 28½ miles, and is W. 5° N. of Mysore distant 26 miles.

2d.—*At Hoonsoor, in Mysore.—By* Wm. Gilchrist, Esq. *of the Madras Medical Establishment.*

	Hour.	Dry thermometer.	Wet bulb therm.	Barometer.	Winds.	Clouds, &c.	Remarks.
Mar. 21	6 A. M.	68	65¾	27.548	E. N. E. occasional airs.	Dense fog.	Dew.
	7	72¾	67¾	.554	Do do do rather stronger.	Fog nearly gone.	
	8	75⅓	69	.574	Do steady do do.	Zenith rather hazy, horizon much so.	
	9	80	69	.600	E. airs merely perceptible.	Do do do less do.	
	10	84	69	.628	Calm. ...	Do do do hazy	
	11	86	66¼	.626	E. N. E. occasional puffs.	Do do do do	
	12	82¼	66	.610	Do do do	Do do do rather hazy.	
	1 P. M.	91	65	.600	Do do do rather strong.	Do clear do do.	
	2	92	64¼	.560	N. E. breeze somewhat gusty.	A few detached white cumuli scattered over sky, horizon still hazy.	Cumuli rose from the W. showing an opposite upper current of air.
	3	91¼	63½	.532	S E. by E. do do do	Large dense, detached cumuli W. horz. dense white cum-strati.	Whirlwinds frequent.
	4	90½	63¾	.514	W. N. W. do.	Cumulo-strati	
	5	91¼	62¾	.520	N. E light breeze.	Zenith cirri, horz. cumulo-strati & hazy	
	6	86¼	72	.530	N. W. breeze.	Cumulo-strati.	Wind has changed frequently last hour between N. E. and N. W.
	7	81¼	71½	.520	S. W. strong breeze.	Zenith clear, horizon hazy, a few cumuli E. horizon.	
	8	78¼	71¼	.536	Do breeze.	Hemisphere hazy.	
	9	77	71	.530	Do do.	Do do.	
	10	76¾	71	.530	Do light breeze.	Do do.	
	11	76	70¾	.528	Do airs occasionally somewhat gusty.	Zenith cirri—horizon hazy.	
	12	76	70½	.540	Do do.	Overcast with cumuli.	
22	1 A. M.	74¼	70	.520	Do do.	Hazy—a few small cumuli.	
	2	73	69	.510	Do light breeze.	Do. small cumuli W. horizon.	
	3	71½	68¼	.516	Do airs.	Small cumulo-strati.	3*h*. 3¼*m*. length of shadow 6.690 inches, upright being 6 inches.
	4	71	68	.512	Calm.	Hazy.	4*h*. 16*m*. do do 14 534 do do.
	5	70	67½	.520	Do.	Do.	The longer the shadow the less distinct the termination.
	6	69¼	66½	.512	Do.	Do.	
	7	72¼	69	.520	Do.	Do.	

8		75½	68½	.528	N. W. occasional light airs.	Hazy.	
9		81¼	70½	.550	Calm	Zenith cloudless, horizon hazy, a few thin cirri S. W.	
10		84	68½	.550	S. E. occasional light airs	Zenith a few cirri, horizon hazy	
11		87	64½	.550	Do do do	Do cloudless, do do a few cirri to S.	
12		88	66½	.550	S. S. E. light breeze occasionally gusty.	Do cirri do do	
1	P. M.	90½	65	.520	Do do do do	Do do do do	Thermometer in sun 97½
2		90	64½	.502	Do breeze do do	Do strati do do	
3		91½	65	.480	Do light breeze do do	Do cirri, horizon hazy, dense white cum-strati have risen near to zenith all round	
4		90¾	64	.462	E. S. E. do do do	Do and W. quarter dense cumuli, horizon cum-strati.	
5		87	72½	.460	S. W. breeze do do	Sky hazy, cumulo-strati and strati	Wind very disagreeable, feels like hot steam.
6		82	71½	.470	Do do steady	General aspect of sky hazy, thin cirri and cumuli in various directions.	

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Abstract Statement of the Funds of the Asiatic Department.

	Disbursements			Receipts.		
Balance in favour of the Society as exhibited in the statement, submitted to the general meeting held on the 30th January 1836	....	..	..	981	4	0
Difference of interest in favour of the Society as stated in Messrs. Binny and Co.'s account closed on the 31st December 1836	....	..	..	22	13	9
Total amount of subscriptions received from the 1st January to the 31st December 1836	....	..	..	858	5	4
Amount realized by the sale of the Madras Journal of Literature and Science	....	..	..	*1125	0	0
Messrs. Binny and Co.'s commission on amount of receipts	23	14	11			
Paid to Mr. Pharoah for printing the 10th, 11th, 12th, and 13th Nos. of the Madras Journal of Literature and Science	1458	14	1			
Stationery	38	9	4			
Pay of the Establishment	450	0	0			
Sundries	106	8	9			
	2077	15	1	2987	7	1
Deduct disbursements				2077	15	1
Balance in favour of the Society				909	8	0

* Memo. since realized, Rupees 203.

The following books were presented ;—

Fatawa Alemgiri, 6 Vols	Bengal Asiatic Society.
Mahabharat, 5 do.	ditto.
Raj Taringini	ditto.
Susruta	ditto.
Jawarne ul ilm ul Riyazi	ditto.
Jervis's Indian Metrology	The Author.
2 Copies of a Catalogue of Stars in the Southern Hemisphere	Hon. Court of Directors.
Result of the Madras Observations for 1834 and 1835	Madras Government.
Report on the State and Navigation of the River Indus below Hyderabad	ditto.
De Kroon Aller Koningen, Van Bocharie Van Djohon	Lieutenant Newbold.
Levensschets Van Sulthan Ibrahiem, translated into Dutch	ditto.
2 Siamese Manuscripts	ditto.
4 Numbers India Journal of Medical and Physical Science	Frederick Corbyn, Esq.
5 do. India Review of Works on Science	ditto.
Prison Discipline Reports	Howard Malcom, Esq.
Transactions of the Horticultural and Agricultural Society of India, Vols. 2 and 3	By the Society.
Chinese Repository, Vols. 3 and 4, and Nos. of Vol. 5, up to No. 6.	By the Editor.

The Vidvun-Moda-Taranginee ; or Fountain of Pleasure to the learned, translated into English, by Rajah Kalee-Krishen Bahadur. Second edition....................	By the Translator.
Bytal-Puchisi ; or the Twenty-five Tales of Bytal, translated from the Brujbhakha into English, by Rajah Kalee-Krishen Bahadur....................................	ditto.

The thanks of the Society were voted to the Donors.

It was announced that the following Gentlemen have been elected Members of the Society.

The Right Rev. The Lord Bishop.
Brigadier General Wilson, c. b.
I. Y. Fullerton, Esq
A. J. Macleane, Esq.
Captain Philpot,
Lieutenant R. S. Dobbs,
Captain W. Walker,
Captain J. Alexander, re-admitted,
G T. Bayfield, Esq.
Captain Wentworth, H. M. 63d Rt.
Lieutenant Pratt, do.
H. Pilleau, Esq. do.
Dr. White,
Captain Forster,
Hon. Sir E. J. Gambier,
Captain J. J. Underwood,
Lieutenant H. Watts,
Captain A. McCally,
Walter Elliot, Esq.
James Shaw, Esq.
Captain F. Senior, 35th N. I.
Rev. H. Cotterill,
Rev. W. Taylor,

During the past year the Society has lost twelve Members by death, retirement, or departure for Europe.

Read the following letter from Robert Clerk, Esq. Secretary to Government ;—

Fort St. George, 18*th October*, 1836.

No. 1533.—Public Department.

Gentlemen,—I am directed by the Right Honourable the Governor in Council to transmit for your consideration the accompanying copy of a letter dated the 16th June last, from Cavelly Venkata Lutchmiah, with its original enclosures, and also copy of a communication from the Supreme Government, dated the 21st ultimo, on the subject thereof.

2. You will be pleased to ascertain whether Mr. W. Taylor is willing to undertake the work indicated by the Asiatic Society in Calcutta, and if so, the precise assistance which he will require from the Government, in addition to that which he may be expected to receive from the Madras Literary Society.

I have the honour to be, Gentlemen,
Your most obedient servant,
Robert Clerk,
Secretary to Govt.

To the Managing Committee
of the Madras Literary Society
and Auxiliary of the Royal Asiatic Society.

The whole subject having been referred to the Committee of Papers, for the purpose of ascertaining from the Rev. W. Taylor, as directed by Government, whether he was willing to enter on the undertaking, the following letter, addressed to that gentleman, was read to the Meeting:

APARTMENTS OF THE LITERARY SOCIETY;
MADRAS, *5th December*, 1836.

SIR,—I am directed by the Committee of Papers of the Madras Literary Society and Auxiliary Royal Asiatic Society to furnish you with the accompanying original letter from the secretary to Government, together with its original enclosures, and to request that you will give the whole correspondence your consideration, and acquaint the Committee, for the information of Government, whether you are disposed to undertake the examination of the Mackenzie MSS. in the manner proposed, and to arrange, translate and prepare for publication, any of those documents which may be deemed worthy of such distinction, and, in general, to superintend whatever may be undertaken regarding these MSS. with the sanction of Government, and under the auspices of the Madras Literary Society.

The Committee avail themselves gladly of this opportunity of declaring their cordial concurrence in the opinion expressed by the Committee of Papers of the Asiatic Society of Bengal, as to your fitness for the task which you are invited to undertake; and, duly estimating the zeal and learning which you have displayed in your published works on the languages and history of the South of India, they are glad to be the medium through which you are invited to a literary employment, which they have abundant reason to believe will be consonant to your tastes, and which must be productive of results, highly interesting to the cause of oriental literature.

Should you have it in your power to devote your time to the work indicated, and if your inclination leads you to accept the proffered employ, I am directed to request you will favour the Committee, at your earliest convenience, with a statement of the personal remuneration which you think sufficient for the appropriation of your time and labour, and of the establishment of pundits and writers, which you consider necessary for your assistance, and any other particulars, which your acquaintance with the MSS. in question may enable you to give, as to the expenses which may have to be incurred in the course of the undertaking.

I have the honour to be,
Sir,
Your most obedient servant,
ROBERT COLE,
Secretary Asiatic Department.

To the
REV. W. TAYLOR.

To which the following reply has been received:—

To R. COLE, ESQ.
Sec. to the Asiatic Dept. of the Madras L. S. and A. R. A. S.
&c. &c. &c.

SIR,—I beg leave to acknowledge the receipt of your letter of the 5th instant, and feel duly sensible of the honour which has been done me.

In reply I have the pleasure to state that I am willing to accept of the proposed office; and to do my best towards filling it in a manner which shall be satisfactory to the high and honourable authorities whence the proposition has, in so flatteringly distinguishing a manner, proceeded.

For the collation and examination of the manuscripts, including the restoration by copying of those injured, decayed, or becoming illegible. as may appear desirable on investigation, I am induced to believe that one year will suffice from the time of commencement, as far as regards the manuscripts now at Madras; but it may be desirable prospectively to allow an additional six months on account of those at Calcutta; of the precise extent of which I have no accurate idea. On drawing up a report of general results and recommendations, I may then hope to be ulteriorly favoured with further instructions as to translating, editing and publishing selected portions, if such a course appear suitable to be adopted.

It will be possibly superfluous here to enter into minute details as to purposed modes of proceeding: these must necessarily come within my own charge and responsibility, if confided to me ; and in all cases of doubt or uncertainty I shall solicit and hope to receive your official guidance. To the Committee of Papers I am deeply obliged, and feel honoured by their confirmation of the opinion of the Council of the Bengal Asiatic Society, in an enlightened public measure, from which I venture to anticipate some results that will justify their decision to the literary world ; and, I would sanguinely hope, distinguish them, in the annals of literature, for an important addition to our knowledge of the history, mythology, philosophy, ethics, and local customs, modes of thinking, and other habits, of the people of this very important portion of the globe.

With respect to the subject of personal remuneration, I beg to declare my very sincere desire that the amount should be on such a moderate scale as to afford evidence of my wish to enter on this work of public utility, with no mercenary motive. I have therefore set down in the margin* a sum which I trust will be considered small for the occasion ; and at the same time not so low as to be derogatory to the character of a literary undertaking of such importance, and possessing so much of a national character even, as that I have been honoured by such high authority with an invitation to enter upon.

As regards the establishment of pundits and writers that may be required, I request to be favoured with the assistance of one Sanscrit pundit, and one Canarese and Hala Canada pundit, together with one superior Tamil moonshee from the College, at such time as I shall feel it expedient to apply for such aid. But as there is much to be done of so subordinate a kind in reading, collating and other details, as not immediately to require such superior assistance, I request to be permitted to engage, at my own entire direction, and not as College servants, one good common Tamil and Telugu moonshee, one Canarese moonshee, and two native writers as copyists ; the services of a moochie and peon could perhaps be made available to me without extra expense. In such case the probable expense might be—

For two common moonshees, each at 15 Rs. per mensem	Rs. 30
Two writers, as copyists, each at 10 Rs....................	„ 20
M. Rupees....	50

The expense of pundits and College moonshees, need not be great ; as only requiring to be put on full pay, and that probably for about half the period of time indicated. In so moderate an estimate I am actuated by a desire to keep my own motives clear of all just blame ; and not to burden the Government with greater expenditure than the efficient conduct of the undertaking will imperatively require.

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* Madras Rupees, three hundred and fifty (350) per mensem.

I have the honour to be,
Sir,
Your most obedient servant,
Madras, *December* 20, 1836. W. Taylor.

It was announced to the Meeting that copies of the two foregoing letters had been received from the Committee of Papers, with the following communication :—

To John Carnac Morris, Esq. F. R. S.
Secretary to the Madras Literary Society, &c.

Sir,—1. I am directed by the Committee of Papers to acknowledge the receipt of your letter, dated 28th October 1836, referring for the consideration of the Committee a letter from Robert Clerk, Esq. Secretary to Government, together with its various enclosures, on the subject of the Mackenzie Manuscripts in the languages vernacular in the Peninsula of India.

2. In accordance with the instructions conveyed in the second paragraph of that letter, I have communicated with the Rev. William Taylor, and a copy of his reply accompanies. It will be seen that that gentleman is willing to undertake the examination, collation and restoration of this portion of the Mackenzie Manuscripts, and that the expense of the undertaking, including personal remuneration to Mr. Taylor, and the pay of moonshees and writers, is estimated at 400 Rupees *per mensem*; exclusive of the assistance, for a time, of certain pundits and moonshees.

3. Taking into consideration that the Manuscripts in question form a considerable portion of a collection, which was considered of sufficient importance to be made the object of a purchase by the Supreme Government at a considerable cost, and that they may contain matter of great interest on the history and literature of this country, the Committee cannot but rejoice that measures are likely to be taken to ascertain their precise nature, until a knowledge of which is attained, the purchase may be considered of uncertain value and the original intention unfulfilled. No person appears more fitted, by talents and previous studies, to undertake the laborious investigation than the Rev. W. Taylor; and the committee rely on his judgment and candour to render such a comprehensive and faithful report on them, as would be a guide when the time arrives for considering the ulterior measures of translation and publication. It will be observed that one year, or a year and a half, is laid down by Mr. Taylor as the time that would probably be required to arrive at such a knowledge of the contents of the manuscripts, here and at Calcutta, as would enable him to frame such a report. For that period, therefore, the above stated expense would be entailed; after which it would be for the consideration of the Society and the determination of Government, whether the further charges for translation and publication should be incurred. The labours of this first period would include a collation of the different manuscripts, rendered necessary by great confusion and intermixture among them (as may be gathered from Mr. Taylor's letter at p. 433 of No. 13 of the Journal of the Society); a resto-

ration, if possible, of injured portions: a fair transcript of parts becoming illegible; and an account of the contents of each in some detail. This of itself would be a very considerable advantage.

4. The Committee further desire me to say that, should the work be entered upon in the proposed manner, they will be most happy to afford every aid in their power towards the accomplishment of a design, alike so worthy of the patronage of our enlightened and liberal Government, and of the encouragement of a Literary Society with objects like our own.

The Committee recommend that no time be lost in obtaining from Calcutta the remainder of the Manuscripts in the peninsular languages.

I have the honour to be,
Sir,
Your most obedient servant,
ROBERT COLE,
Secretary Asiatic Department.

Resolved, unanimously—That copies of the foregoing correspondence be transmitted for the information of Government, with an expression of regret that the funds of the Society are quite inadequate to afford any pecuniary aid to this highly desirable public undertaking; but that all the assistance which the Society can render, as a literary body, will be cordially and gladly yielded during the progress of the work.

Read the following letter from Sir Alexander Johnston, Chairman of the Committee of Correspondence of the Royal Asiatic Society.

ROYAL ASIATIC SOCIETY:
Grafton Street, Bond Street, June, 1836.

GENTLEMEN,

The vast extent, fertility, and populousness of our Indian possessions, are known, in a general way, to all the world. A glance, indeed, at the map will shew that their extremes of latitude may, without exaggeration, be indicated by the distance from Gibraltar to the farthest point of Scotland; and that the measure of their extent, from west to east, will be nearly found in a line drawn from the Bay of Biscay to the Black Sea. Lying between the 5th and 31st degree of north latitude, with almost every conceivable variety of position and exposure, they present a range of soil and climate greatly exceeding that which is to be found within the bounds of Europe. They embrace, in truth, the utmost limits of vegetable life, from the burning heat of the desert to the point of perpetual congelation: presenting in one quarter, the loftiest mountains in the world; and, in another, vast alluvial plains, intersected by the natural channels of many noble rivers, with a corresponding variety of productions belonging both to tropical and northern regions. Not less than 80 millions of people are subject to the dominion of England: already they produce (though with imperfect skill) most of the articles which form the great staples of the import trade of this country, as materials of its manufacture, or as the objects of comfort and luxury to the great body of its inhabitants, of which cotton, silk, indigo, sugar, coffee, and tobacco, may be mentioned as pre-eminent; and they offer an assured prospect of an almost boundless market for the produce of English manufacturing skill, if the capabilities of their country be drawn forth, and their industry be duly instructed, directed, and fostered.

But though these general truths be readily acknowledged, their practical application is very imperfectly understood. Few men in England really know what India does or can produce, with sufficient precision, at least, to justify commercial speculation. Few in India know what England requires; and none of the lights of modern science having been applied to the agriculture of the former country, its productive powers have, as yet, been very imperfectly developed.

Believing that the interests of both countries may be very importantly promoted by an interchange of knowledge, and especially by communicating to India the information and stimulus which are alone wanting to the full development of its vast resources, it has been resolved by the Royal Asiatic Society, to constitute a distinct Section, for the following, and other similar purposes; provided the necessary funds can be raised for giving adequate effect to the design.

1st. The examination of the natural and agricultural products of India, available for the purposes of commerce and art.

2dly. Inquiry into the causes of the general inferiority of the staple articles of Indian commerce.

3dly. The introduction of new articles and processes from analogous climates in other parts of the world.

The Committee of Correspondence of the Royal Asiatic Society beg leave to bring the circumstance to your notice; trusting, confidently, on your zealous support of a measure, calculated to promote objects alike interesting to the patriot and the philanthropist.

Of the means of support, the most acceptable would, of course, be such an accession of new members, European or Asiatic, as would at once provide the necessary funds, and as would afford the requisite contribution of knowledge and experience in the various branches of inquiry to which the labours of the Section are to be directed. But the Society will be most happy to receive the tender of the aid (whether in knowledge or funds) of affiliated Societies, pursuing the same beneficial objects, or any other co-operation or assistance which you may have the goodness to offer.

For the fuller explanation of the scheme in question, the Committee direct me to transmit to you the accompanying printed papers; and I shall be happy to afford you any further information in my power, in regard to it, that you may require.

I have the honour to be,
Gentlemen,
Your most obedient humble servant,
(Signed) Alexander Johnston,
Chairman of the Committee
of Correspondence R. A. S.

To the President,
Vice Presidents and Members
of the Madras Literary Society
and Auxiliary R. A. S.

Read a letter from Henry Chamier, Esq. Chief Secretary to Government, forwarding a copy of a letter, addressed by order of the Right Honourable the Governor in Council to the Board of Revenue, directing that the Secretary to the Society, should have access to the Reports of the Civil Engineers, with a view to a selection from the valuable matter contained therein for publication in the Journal of the Society.

The Committee in the Asiatic Department, to whom this letter was referred, will gladly avail themselves of this considerate and liberal order of the Right Honourable the Governor in Council; and their cordial thanks, and the acknowledgments of this Meeting, are respectfully tendered for the privilege granted to the Society.

Read the following extract from a letter from Lieutenant Newbold, with reference to the Siamese MSS. which were laid on the table, presented to the Society by that gentleman:

"I send for presentation to the Society two Siamese books printed at Batavia. What they relate to I know not, having lost the *catalogue raisonnée* of books I brought over from the Straits. These are intended as an *avant courier* of 10 vols. of MSS. Siamese history, which are now on the road to Madras from the Straits, and which I intend for the Society's library, as also a small volume of Siamese laws.

"It would be a great piece of good fortune could the translation of these ancient chronicles in the T'hay language go on simultaneously with that of the history of Lanca in the Cingalese, by the Hon. Mr. Turnour, and that of the Peninsula by Mr. Taylor.

"The Siamese are Buddhists of great antiquity. Their language is monosyllabic; its character you have an opportunity of judging of. Leyden states that the Siamese histories of the T'hay dynasty go back only for the space of 1,400 years; but observes that the records of the T'hay J'hay dynasty are supposed still to exist, from which "it may still be possible to glean a few grains of pure historic gold from the sands which glitter in the long valleys of the *Mênam* and *Mekon*."

"At all events from the collation of the three histories of Peninsular India, Ceylon and Siam, much light would doubtless be thrown on the origin of Buddhism, and perhaps on that of Indo Chinese nations in general.

"Although the historical romances of the Siamese are said to bear little similarity to those of the Brahmuns, still the introduction of Rama and the characters that figure in the Ramayana evince a connexion with Peninsular India. Whether this connexion is merely a literary one or not, remains to be cleared up.

"The Siamese have many romances in common with the Javans, Malays and Buggis, and probably with the Birmese and Peguers.

"According to Hamilton the Buddhism of Siam appears to be identical with that of Ceylon, differing from that professed in Tartary, Hindostan, China, Japan, and Cochin China. The leading doctrine is the transmigration of the soul, and *Ni-ripen* (*nirwana*), or ultimate absorption into the essence of the deity. "The priests "have neither rank, influence nor endowments, the sovereign being the real "head of the church and himself an incarnation of the Buddha."

Read extract of a letter from John Bell, Esq. Secretary to the Agricultural and Horticultural Society of India, forwarding copies of the 2d and 3d volumes of the Transactions of that Society, and offering, on his own part, copies of his works on the Commerce of Bengal. The acknowledgments of the Society are tendered to Mr. Bell, with the assurance that the donation will be most acceptable.

Read a Letter from Rajah Kalikrishna Bahadur of Calcutta, forwarding copies of his translations into English from Sanscrit and Braj-Bháká for presentation to the Society. The acknowledgments of the Society are offered to the Rajah for the same.

Read a letter from M. Eugene Arnoult, editor of the Journal, entitled *L' Institut*, proposing that the Society should communicate an account of its transactions for insertion in the periodical conducted by him; also abstracts of all papers presented to the Society, and copies of works published, and requesting the Society to subscribe to his publication.

Ordered that the Journal of the Society be transmitted to M. Arnoult, with the intimation that the Society will be glad to exchange publications.

It was intimated that, in accordance with the vote of last year, the following works were ordered and had been received from the bookseller;

	Vols.
Hardwicke's Indian Zoology. By Gray	2
A Series of Maps Modern and Ancient	1
Supplement to the Encyclopædia Britannica, 5th and 6th Vols.	2
Webster's English Dictionary	2
Dictionnaire De L'Academie Française	2
Græcum Lexicon Hederico	1
Marsden's Malay Dictionary	1
Alberti Dictionnaire, Française-Italien, et Italien-Française	2
German Dictionary. By Flugel	2
Spanish Dictionary. By Newman and Baretti	2
Italian Dictionary. By Baretti	2
Portuguese Dictionary. By Vieyra	2
Gesenius's Hebrew Lexicon	1
Watson's Biblical and Theological Dictionary	1
Heyne's Tracts on India	1
Sowerby's Mineral Conchology	6
Lyell's Principles of Geology	3
De La Beche's Geological Manual	1
Lindley's Introduction to Botany	1
Lindley's Natural System of Botany	1
Prodromus Floræ Peninsulæ Indiæ Orientalis. By Wight and Arnott	1
Malte-Brun's Universal Geography	9
Turner's Elements of Chemistry	1
Royle's Illustrations of the Botany and other branches of the Natural History of the Himalayan Mountains—9 parts.	
Lardner's Cabinet Cyclopædia	82

The following donations were presented for the Museum :—

Minerals illustrative of Dr. Benza's Geological Papers which have appeared in the Journal of the Society.—By the Author.

A very extensive collection of minerals from the Malay Peninsula, the country between Madras and Bellary and various places of the Ceded Districts.—By Lieut. Newbold.

Geological specimens collected on a journey from Madras to Hoonsoor, and a very extensive suite illustrative of the Magnesite deposit at the latter place.—By Mr. Gilchrist.

A series of specimens of the Magnesite of Salem, and its associated minerals.—By Dr. Wight.

Specimens of trap and laterite from Beder in the Hyderabad territory. (See Madras Journal No. 12, p. 103).—By Lieut. Morland, Assistant Surveyor General.

Minerals from Combaconum.—By the Rev. Mr. Addis.

Geological specimens from Ava, collected by Captain Hannay on his mission to the Singphos.—By G. T. Bayfield, Esq.

The crown of a tooth of the fossil Mastodon in a very perfect state of preservation, from the same country.—By the same.

A terracotta Buddhist image, and one in brass, from Tagoung, the ancient capital of the Burmese empire, bearing Deva-nâgari inscriptions, discovered by Captain Hannay. (See *Journal of the Asiatic Society of Bengal* for March 1836).—By the same.

The best thanks of the Society are tendered to the respective donors.

The limited dimensions of the Society's Apartments is remarked on, and it is brought to the notice of the Meeting by the Secretary that no space exists for the accommodation of the increasing Library of the Society, and for the minerals, antiquities, and other donations, continually presented for the Museum, a great number of which cannot be arranged for want of room.

It is resolved,—That the College Board be addressed to solicit permission for the Society to occupy the central room of the upper floor in the front range of the College, as a Museum, which would enable the Society to allot the whole of the lower apartments to its library.

Resolved,—That, with reference to the order given by Sir FREDERICK ADAM for the transfer of certain sculptures at Masulipatam to the Museum of the Society, the Collector of the district be addressed to request that he will favour the Society by giving the necessary instructions to that effect.—*Vide Journal, No.* 14, *p.* 45.

The Honourable the PRESIDENT is requested to obtain an interview with the Right Honourable LORD ELPHINSTONE, and to solicit His Lordship to accept the office of PATRON of the Society.

XII.—Notices of Books.

Transactions of the Agricultural and Horticultural Society of India, Vol. 3d.—Printed at the Serampore Press, 1837.—pp. 320, 8vo.

We hail with no ordinary feelings of satisfaction, the appearance of the third volume of the *Transactions* of the *Agricultural* and *Horticultural Society of India*; presenting us with a detailed account of its proceedings, during the past year. The unequivocal evidence which it affords, of the recent rapid rise in public estimation of the sister sciences of agriculture and horticulture, must prove highly gratifying to every philanthropic mind, on the reflection how intimately their advancement is connected with the welfare and prosperity of the people, in a country so essentially agricultural as this is.

In this view we cannot deny ourselves the pleasure, which the present opportunity affords, of congratulating the country at large, on the possession within its metropolis of such an enterprising association; enjoying as it does the full confidence and liberal patronage of the Indian government; collecting, from all quarters, the accumulated experience of numerous labourers in the same field, to diffuse it, through these volumes, to every part of the civilized world; while, at the same time, it is generously aiding, with its unrivalled means, the formation of numerous other associations, under the same denomination and having similar objects in view, in all parts of the country, all of which are endeavouring, but at a humble distance, to diffuse, within the more contracted limits of their respective localities, the benefits which it is conferring on all India. That the metropolitan societies of the sister presidencies, are, as yet, far from being competent to enter the lists with the parent institution, in the honourable and friendly rivalry of doing good, is a subject rather of regret than of wonder, when it is borne in mind, that they are both comparatively in their infancy, with few members, limited means, and one, at least, (the Madras Sooiety), as yet unaided by any share of government patronage, which has been so liberally extended to the others.* We would not, however, have our agricultural friends in this quarter to despair of having their application for assistance ultimately attended to, since it has not been refused, and we venture to think is only withheld until by its acts the Society has established its claim to the indulgence. Let it prove itself worthy, and we think we may safely predict that it will not be kept long in suspense as to the result of its application, and we think we may with equal safety adduce the two last reports of its proceedings as favourable examples of how much

The Calcutta Society has received, nearly from its commencement, 1000 rupees annually, which has latterly been increased, by a monthly donation to about 2,800, exclusive of 20,000 formerly contributed. The Bombay Society we understand received a donation of 10,000 in aid of its funds. This is as it ought to be, these societies are formed for the good of the country, much more than for any benefit which can accrue to the members and have a claim on the country's support in aid of their exertions for its benefit.

good may be expected to result from its persevering exertions in the course it is now pursuing. While we thus call on the managers of the Society's affairs, at the presidency, diligently to perform the responsible duties they have voluntarily undertaken, we would remind its members, now widely scattered over the interior, that the largest streams are but the aggregate of numerous rills, and that, without their constant contributions, the most mighty rivers would soon be reduced to barren sandy beds; that it is therefore incumbent on them, if they wish well to the country and institution, to afford assistance by contributing all the information in their power.

But should the application of the Society fail in procuring for it the solicited aid, let it be borne in mind, that it is not the pampered nursling, brought up in the lap of luxury, but he who has from his infancy been trained in the school of adversity, that generally proves the most efficient man. In case of disappointment, therefore, there must not be despair, but a redoubling of the Society's exertions. Let it be remembered, that even the Calcutta Society, with all its advantages, was at one time reduced to the brink of ruin, from which it was only saved by the energy of a few of its members.

If such was the case there, in the midst of a dense population, with numerous supporters, and in the receipt of an annual donation from government, it need not be wondered at, if on this side of India, deprived of such advantages, the Madras Society has to encounter similar shocks: but let warning be taken to avoid the rock on which the Calcutta Society so nearly foundered, namely, a too exclusive attention to horticultural operations, leading to the ruin of the funds, and the neglect of the other and more important objects of the institution.

While we thus warn our friends against falling into so grave an error, we disclaim all connection with those persons who urge exclusive attention to agriculture, to the neglect of horticulture, on the part of the Society as a body. They seem to forget, that a large portion of the natives live almost exclusively on vegetable food; that the introduction of our better sorts of culinary vegetables is an object of paramount importance, and that this must be accomplished by the conviction, on their parts, that ours are better than their own; a conviction, which can only be established by actual demonstration, and not by assertion.

At the outset of its career the Bengal Society acted on this principle, and, aided by premiums, with such success, in teaching the natives our mode of culture and the superiority of our vegetables, that it can now dispense with so costly an appendage as a garden. That a similar effect is in progress here, is evident from the marked improvement in quality of the last show of vegetables, as compared with the preceding. But the advantage of forming horticultural schools, though a great one, is not the only or even principal benefit derived from such establishments.

In them experiments, requiring years for their completion, can be undertaken, and conducted through their whole course on the most philosophical principles, not subject to the numerous accidents and contingencies to which individual enterprise is exposed, and at a cost, too, which might for ever prove a bar to their being undertaken for personal gratification, or even in the uncertain hope of their proving a lucrative speculation. An example in point occurs to our memory—hitherto it has been supposed, but without any proof, that the climate of Madras is altogether unfavourable to the production of coffee, and that it never can be grown to advantage here. The determination of this question, appearing to the Society, in a commercial point of view, a matter of the first importance, it has undertaken to set it at rest, by devoting a portion of the garden to the formation of a coffee plantation. Other experiments of the same kind, and having similar objects in view, are now either in progress, or in contemplation with the return of the season.

In addition to these measures actually in progress, arrangements are making to carry into effect, on a scale commensurate with the Society's means, the suggestions of Dr. Wight, published in the pages both of this Journal and in the volume of transactions before us, for the acclimating of foreign fruit and timber trees, edible vegetables, &c.; while it is wished to devote a portion of the garden to the formation of a nursery, for the introduction to the plains of the more valuable sorts of indigenous timber trees, hitherto scarcely known as living plants beyond the precincts of their native jungles. These, in a public point of view, are all important objects, for the attainment of which in Bengal the Botanic Garden is maintained at the public expense; but which in Madras (where no establishment of the kind exists), unless the Society take them in hand, must ever remain undone, for no private individual, however zealous, or whatever may be his pecuniary resources, while subject to all the uncertainties of removal, can be expected to engage in such endless and unrequited labours. Nor must we, in contemplating the general advantages to be derived from such establishments, overlook the local circumstances which render a garden, at whatever cost, almost indispensable to the success of the Madras Society. Here we have not, as in Calcutta, a large government garden, on which to fall back in a case of necessity. There the talented and enthusiastic superintendent of the noblest Botanic Garden in the world, has, hitherto, always been able, when necessary, to appropriate a portion of its extensive grounds to the furtherance of the useful objects of the Society. In Madras, on the contrary, the government apply to the Society to aid its efforts for the amelioration of the country.

We have been induced to enter thus largely on the consideration of the general subject of Horticultural Societies, and of the Madras one in particular, not, we trust, from having formed an exaggerated estimate of their usefulness, which is certainly great, but in the hope that even our feeble voice may be heard in a distant quarter, and prove not altogether uninfluential in inducing the government of India to place our Society on a par, at least, with that of Bombay, the more so, as it has difficulties and disadvantages of climate to encounter, scarcely to be met with in any other part of India, and has, besides, so wide an extent of country to influence by its example. But, while we thus humbly solicit the supreme government to assist the Society in carrying into effect the very meritorious works on which it is engaged, we address the inhabitants, both European and Native, of the Madras presidency, with more confidence, in the full assurance, that, whatever may be the decision of the supreme government, they will prove themselves worthy of possessing an institution, fitted to diffuse among them much substantial good, and to afford those who take a more immediate interest in its proceedings an inexhaustible fund of agreeable recreation. Let it therefore be the object, as it undoubtedly is the interest, of one and all, to support it heart and hand, in such a manner, that those who willingly and gratuitously put their hands to the work of managing its affairs, may not have them paralysed for want of means to continue their laudable exertions.

To the managers, and presidency members, we would say, recollect the eyes of the whole country are upon you—your proceedings are narrowly watched—and, unless you prove yourselves good stewards and deserving the confidence reposed in you, it will soon be estranged: furnish therefore your friends in the provinces with the means of coming to a correct judgment on your stewardship, by holding regular meetings, at fixed intervals (which are not to be departed from), for the formal transaction of business, reports of which are to be duly published for the information of distant members. Conduct the business of the Society thus regularly and methodically, and you will have little reason to complain of the want either of confidence or support on the part of the provinces.

But we must now return to the point from which we set out, and from which, in our anxiety to forward the cause of agricultural reform and improvement, we have been insensibly led so long to digress—the consideration of the *Transactions of the Agricultural and Horticultural Society of India.* The volume before us is the third of the series. The Society was constituted in 1820, and, early in 1829, published the first volume. Seven years after, in 1836, the second volume issued from the press, and in 1837 the third, equalling in its dimensions either of the preceding two, and showing, in a very advantageous point of view, the growing attention which is given to these pursuits, and the very decided advantages resulting from early publicity, more effectually to secure which, the transactions are published in parts every three or four months.

The present volume contains 60 original papers occupying the first 198 pages; an appendix; and the remaining portion of the volume (103 pages), under the head of 'Proceedings', gives an abstract of the whole business transacted at the various meetings of the Society. The papers are, as a matter of course, miscellaneously arranged, in the order they were read at the successive meetings. In this notice, instead of considering them seriatim, we will arrange our remarks under separate heads of horticulture and agriculture; the latter divided into two branches, 1st as applied to the production of food; 2d to commercial produce—the second occupying by far the larger portion of the volume.

Of the sixty papers, six only can be considered exclusively horticultural, the first is from the pen of Mr. Masters, the intelligent head gardener of the Botanic Garden, "*On the Propagation of Exogenous Plants.*"

The term exogenous applies to all dicotyledonous plants; but, in the present instance, it may be considered as restricted to trees and shrubs, furnished with a distinct bark, and increasing outwards by annual layers of wood deposited between the bark and that of the preceding year; in contradistinction to the whole tribe of palms, which never increase in thickness from the first, and harden by age from the surface towards the centre. These last, not producing buds and branches, cannot be propagated by any of the methods adapted to increase exogenous plants; namely, grafting, layering, cutting or *gootties*. The main object of the paper is to make better known, and show the advantage of, this last method over all the others. The operation is a very simple one, and much more practised among native than European gardeners. "In young branches of exogenous plants the bark is easily separated from the wood, and if from a young branch of the Letchee tree (or indeed any other tree) we take off a ring of bark nearly an inch in breadth, at a small distance below a healthy leaf-bud, taking care to cut off all communication between the bark above and below; and at the same time if we cover the wound with soft well tempered earth, binding it on securely with any soft bandage, and keeping the whole constantly moistened with water; at the end of about 4 months we shall obtain a strong well rooted plant. As the fibres are emitted from the buds that are above the wound, they will descend into the ball of earth and form roots; as soon as they are seen protruding themselves through the bandage, the branch may be cut off and planted where it is to remain. This method is called propagating by *gootties*, and appears to be the most expeditious method of obtaining strong well rooted plants."

"Of 65 gootties, made in June last, of the *Jonesia Asoca*, the whole were well rooted in October; of 45 layers, made at the same time, none are well rooted now (December), and some just beginning to form." "Of 450 gootties of the Letchee, made in March last, the greater part were taken off well rooted in June, while of 18 layers of *Cordia Sibastina*, made on the 13th November 1832, only one has made sufficient roots to be planted out with safety."

By cuttings is another expeditious and sure method of continuing an individual species or variety. "Of 5,000 cuttings, put into the ground in July last, embracing 56 species, about 3-4ths of them are good rooted plants. Out of 7000 put into the ground in October, embracing 50 species, about 1-3d are dead." From which it appears that early in the rains is the most desirable time to plant cuttings.

The next paper we have to notice is Mr. Speed's "*Remarks on the best mode of cultivating Celery.*" This is a most valuable contribution to agricultural science, as developing a new principle in tropical agriculture, for an account of which we refer to Dr. Wight's paper, page 40 in the last number of this Journal. His improvement consisted in sprouting the seed in a hot bed under glass; it was afterwards found to resist the heat of the climate, better than when raised in the ordinary manner in the shade. It is to be hoped he will follow up the subject by ascertaining whether plants, raised from the seeds of these plants, resist the climate like those of indigenous vegetables, or, in other words, are acclimated; in which case the experiment will prove one of vast importance.

The last paper on horticulture, and of the volume, is "*Directions for cultivating some of the most approved European and Native vegetables in Bengal*, by *Mr. Masters.*" From this we make a few extracts. "*Artichoke*, perennial, native of the South of Europe, propagated by seeds, and by suckers. Sow in October, or at any time between September and May. Sow in rich light soil, and when the plants are two or three inches high, prick them out in a fresh bed, six inches distant from each other; when they have become well-rooted, transplant them into deep, rich soil, setting them two feet apart. To propagate by suckers, take off the suckers towards the end of the rainy season, and prick them out six inches apart, treating them in the same manner as directed for seedlings; or if large, they may be planted at once where they are intended to remain. Artichokes in this country are apt to run too much to leaves, producing small heads; to prevent this and to increase the size of the heads, when the plants are from ten to fifteen inches high, cut them off close to the ground, and cover them over with light, dry, old manure; when they have advanced a few inches above the soil, repeat the operation. If the young plants are tied up for a few days before being cut off, they will become blanched, and may be eaten as salad."

Cabbage.—"Sow from August to November; if before the rains cease, sow in *gumlahs*, and prick out the young plants in sheltered beds of light rich earth; when they have become strong and well rooted, plant them out in strongly manured ground, two feet distant from each other. Plant the late crops in trenches, keeping the plants well earthed up as they grow, and give them plenty of water."

Cauliflower.—"Sow from September to November, and prick out the plants when about two inches high in light soil; when sufficiently strong, plant them in trenches two feet apart, and fill in with old manure. In dry situations, where the plants can be preserved during the rains, sow in February or March. Cauliflowers may also be propagated by cuttings." The following short paper C. K. Robison, Esq. from vol. 2 page 29, appears deserving of attention as it seems to afford a satisfactory explanation of the unusual success which has attended all attempts to raise these vegetables this season at Madras—the seed sown, being the produce of Bengal hence acclimated.

"From an experience of nine years, the duration of this Society, I have found, that in order to have good and early crops of cauliflowers, cabbage, peas, turnips, &c. it is absolutely necessary to sow only acclimated seeds; that is, seed which was the produce of plants raised from imported European or foreign seed, sown during the previous year; and that, for the later crops, Cape of Good Hope and Van Dieman's Land seed answer best. European seeds should never, in my opinion, be sown before the 1st November, and the produce should be chiefly reserved as acclimated seed, for the following season. Hitherto, the distribution of English seeds to the members of the Society has been the cause of uniform disappointment."

Cucumber.—"Sow in rich, light soil, giving the plants plenty of room to run. When they have made four leaves, stop them, by pinching off the leading bud; they will then produce two lateral shoots, which stop in a similar manner; and so continue to treat every new formed shoot, stopping it at the second or third joint. When the plants begin to show fruit, stop the fruiting branches two joints before the fruit, cover the ground with leaves or straw to keep the roots cool, and to prevent the fruit from becoming spotted."

It is a subject of regret in this quarter that Mr. M. has only given us the Bengal names of the native vegetables introduced into his list, as many of them are totally unknown on the coast. Botanical names would have done much, with the assistance of Ainsley's *Materia Medica Indica*, to relieve us from this difficulty.

Agriculture.—In this division the first papers are two short ones on the introduction of American maize. These are in continuation of other two printed in the preceding volume, from which it appears that this variety is not only much better in quality, but is reckoned to produce 20 per cent in return better than the variety in use in this country; and with less culture. "The introduction of maize on a large scale might I think be successfully followed up without more labour than the planting between the stubble when the paddy is cut. The proper season for planting in Bengal appears to me about the middle of April. The corn should be steeped in water 12 hours, then buried in a cloth under ground until the germs appear. Three seeds in each hole, about four feet apart, will be found the proper distance."—Bell.

On the Coromandel coast where our rice crops are so subject to failure from irregularity of the monsoons, it appears very desirable to introduce largely the culture of so hardy and prolific a grain, and deserving the attention of the Agricultural Society. Small parcels of seed, of the best foreign varieties, might be sent all over the country for trial, and no doubt it would spread if the natives found it a profitable crop.

Guinea grass.—There are three short papers on the culture of this very valuable grass by Messrs. Bell and Hurry, explanatory of the mode of propagating it by both seeds and cuttings. The mode I adopted (for propagating by seed) is this, I prepare a small plot of ground, shaded from the morning sun, being well pulverized, the seed is then freely scattered over it, when the mallee (gardener) kneads the surface with his fingers so as loosely to bury the seed. If the weather is very hot, I cover the plot with mats for a few days *without watering*, and I have never once failed to have abundant returns. When the young grass is about 3 inches, high I have each plant carefully pricked out, so as not to disturb the root, and transplanted into regular beds two feet apart, watering them for a few evenings, until they have taken firm hold of the soil. I have sown guinea grass in every month of the year, and the results have always been successful." Bell.—"Having successfully cultivated this grass for seven years I cannot too strongly recommend it to all planters who require substantial food for cattle.*** The conditions necessary to success in this cultivation are that the lands should not be inundated, nor water stagnate on it, that the crop be kept clean and the land well manured, and after two years the crop changed. The quantity produced from good land, with a little care, is quite prodigious, and four or five cuttings may be obtained in the season. With watering, an early cutting can be got, if required. I have some which will yield a fair cutting in about fourteen days. In the cold weather it scarcely grows at all, but from March to October it will yield a constant succession of crops, and is a most valuable addition to our green food. In planting, I have found that joints four or five inches long, and about as far apart, set out like canes, generally took root in a week, and, even in the driest weather, a single watering was sufficient to save them all. Close planting answers best, as one weeding is then generally enough; if distant, the coarse grasses generally choak it, unless great attention is paid. I have had as much as forty tons of green food from a single beegah, ascertained by weighing the cuttings of a square yard at a time. It is evident that such a crop must exhaust the land, and for that reason I think it fails if continued beyond the second year."

Joomla rice—Victoria wheat—American sumach.—This paper or rather series of papers is made up, 1st, of extracts of correspondence between Dr. Wallich and Mr. Robert Stuart, Resident of Nepal, on the cultivation of mountain rice, and the probability of its successful introduction into Europe; with a report of experiments, made in the Chelsea Botanic Garden, to determine the practicability of its culture in England, by Mr. Anderson the curator, which failed perhaps from bad management. 2d, an extract from the Plymouth Journal for August 1833, on the Victoria wheat, recommending its introduction into England, on the two-fold grounds of its being exceedingly prolific, and very rapid in its progress to maturity. Whether it would retain these properties in England seems very doubtful. Some that was introduced into Mysore required upwards of 100 days to mature its crop; in its native country from 70 to 75 days is the time specified. This great difference may depend on the climate of Mysore, being colder than that of Victoria. Would it retain its original properties if sown in the warmer climate of the Carnatic? The subject seems to merit a careful trial, and from sowings in several successive months, commencing with the rains in July. We recommend it to the attention of the Agricultural Society. 3d, another extract from the same Journal on American sumach *(Cæsalpinea coredria)*. This substance promises to prove such a valuable contribution to the arts, and, probably, at no distant period, to the commerce of this country, that we are tempted to transfer the paper entire to our pages;* the more so as the plant is of tropical origin, and has already been successfully introduced into the Calcutta Botanic garden, as appears from the following notice in the proceedings of the Society. "The Doctor informs the Society that he has secured a number of plants of the *Cæsalpinea corearia*, or American sumach, raised from seed presented by Mr. Hamilton."

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* See *Selections* p. 348.—Ed.

Sugar and Sugar-cane culture.—There are six papers connected with these subjects in the volume. The first, Mr. Piddington's account of the best soils for the cultivation of the sugar cane, has been reprinted in this Journal* ; of the remaining five, three are occupied with accounts of the rapid progress now making in the introduction of the Otaheitan or Mauritius sugar-cane, and its great superiority over indigenous and Chinese sorts now generally in use ; a superiority so self-evident that, wherever they have been tried, the ryots have immediately adopted it. The following extracts from a letter (page 73) of Captain Sleeman, general Superintendent in the Sagour and Nerbudda territory, will show the estimation in which it is held in these districts. "A portion of the cane at Jabulpoor is every season sold in the bazar to cover the expenses of the plantation, and those of experiments in the manufacture of sugar; and the funds have hitherto been found fully sufficient for the purpose." (Proceedings page 39 and 40). "Proved by successful experiments that sugar of excellent quality can be made in the valley of the Nerbudda, a thing never believed by the inhabitants before this plantation was established. The sugar, made by the aid of men from the sugar districts in Oude, bore the same price in the bazars, as that brought from Mirzapore. 2d, that the sugar made from the Otaheite cane is rather better in quality than that made from the small straw coloured cane of the country, and far superior to that made from the large purple cane. 3d, That the cane, after eight years planting, was last season as fine in its beautiful straw-colour, in its size and in the quality of its juice, as when gathered for me in the manufacture by the present secretary of that colony (Mauritius), Captain Hick, in 1827. The plants I brought with me were deposited in the Botanic Garden in Calcutta March 1827, and, in the following season, I was supplied at Jabulpoor with cuttings from these plants. These canes now sent into the bazar as they are cut and sold, fetch about four times as much as the largest cane of the country, being much longer and the juice much finer."

Our notice of this work has already extended to so great a length, that we feel ourselves constrained to defer, till our next number, the consideration of the remaining portion (comprising the whole of the commercial branch of our arrangement); on which occasion we hope to present our readers with a comprehensive account of the numerous papers, forming the bulk of the volume, on the cultivation of cotton and tobacco.

R. W.

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* *Vide* No. 13, p. 483.

XIII.—Selections.

1.—*Letter from Mr.* N. B. Ward *to Sir* W. J. Hooker, *on the Growth of Plants without open Exposure to Air.*

Wellclose Square, London, March, 1836.

My dear Sir,

I have lately heard that you wish for some information respecting my new method of growing plants without open exposure to air. As I do not intend to publish at present a detailed account, and as much misrepresentation exists upon the subject, I feel great pleasure in furnishing you with the principal facts, of which you may make any use you please.

The depressing influence of the air of large towns upon vegetation, had, for many years, engaged my attention.

The science of Botany, in consequence of the perusal of the works of the immortal Linnæus, had occupied me from my youth up, and the earliest object of my ambition was to possess an old wall, covered with ferns and mosses. Compelled by circumstances to live surrounded by, and enveloped in, the smoke of numerous manufactories, all my endeavours to keep my favourites alive, proved sooner or later unavailing. I was led, however, to reflect a little more deeply upon the subject, in consequence of a simple incident, which occurred about seven or eight years ago. I had buried the chrysalis of a Sphynx in some moist mould, which was contained in a wide-mouthed glass bottle, covered with a lid. In watching the bottle from day to day, I observed that the moisture which during the heat of the day arose from the mould, condensed on the internal surface of the glass, and returned from whence it came, thus keeping the mould always equally moist. About a week prior to the final change of the insect, a seedling Fern and Grass made their appearance upon the surface of the mould.

After I had secured my insect, I was anxious to watch the development of these plants in such a confined situation, and accordingly placed the bottle outside my study window. The plants continued to grow, and turned out to be the *Poa annua* and *Nephrodium Filix mas.* I now commenced a series of experiments upon other plants, principally Ferns, selecting those that were most difficult of culture, such as *Hymenophyllum,* &c. My method of proceeding was as follows:—Keeping nature always in view, I endeavoured to imitate the natural condition of the plants as much as possible, as regarded the exposure to light, solar heat, moisture, &c. Thus, if Ferns were the subject of experiment, they were planted in the mould most congenial to them, well watered, but all the superfluous water allowed to drain off, and then placed in a situation having a northern aspect. If, on the contrary, I wished to grow *Cacti*, they were planted in a mixture of loam and sand, suspended from the roof of the case, and fully exposed to solar heat. Upon this part of the subject I need not, however, dilate any further, and will therefore confine myself to the results obtained.

1st, That the depressing influence of the air of large towns upon vegetation depends almost entirely upon the fuliginous matter with which such an atmosphere is impregnated, and which produces the same effect upon the leaves of plants as upon the lungs of animals.

2ndly, That, owing to the quiet state of the atmosphere surrounding the plants in my inclosed cases, the plants, like human beings, will bear extremes of heat and of cold, which under ordinary circumstances would be fatal to them. It is well known, from the experiments of Sir C. Blagden, and others, that man will bear great degrees of heat with impunity, provided the atmosphere be undisturbed, and it is equally a matter of fact, that the extremest cold of the Arctic Regions produces no bad effect, when the air is quite still. Mr. King, who has recently returned from Captain Back's Expedition, informed me that the greatest degree of cold he experienced was nearly 70 deg. below zero; that no inconvenience was felt at that low temperature, owing to the perfectly calm state of the air; but that if the wind arose, although the thermometer would likewise rapidly rise with the wind, the cold then became insupportable.

These facts I have proved in the one case, by the exposure to sun of *Hymenophyllum* and *Trichomanes*; and in the other by growing without heat *Aspidium molle*, *Phœnix dactylifera*, *Rhapis flabelliformis*, *Dendrobium pulchellum*, *Mammillaria tenuis*, &c. &c.

3rdly, That owing to the prevention of the escape of the moisture contained within the cases, plants will grow for many months, and even for years, without requiring fresh supplies of water. Thus, in the first experiment, the *Poa* and *Nephrodium* grew for four years, without one drop of water having been given to them during that period, and would, I believe, have grown as many more, had they not accidentally perished in consequence of the rusting of the tin lid covering the bottle, and the admission of rain-water.

4thly, That the degree of development to which the plants attain, depend mainly, *cæteris paribus*, upon the volume of air contained within the case, and upon the quantity of light and solar heat received by the plants. Thus to revert to the first experiment. The *Poa* and *Nephrodium*, being contained within a small bottle—the one flowered but once during its confinement, while the other did not produce any capsules. Both *Ferns* and *Grasses*, in my larger cases, flower and fruit well. *Phænogamous plants*, such for instance, as *Ipomæa Quamoclit* and *coccinea*, will not flower in a case exposed to the north, while in the same case, fully exposed to the south, these very plants come up from seed, and flower very well.

To sum up all, in every place where there is light, even in the centre of the most crowded and smoky cities, plants of almost every family may be grown, and particularly those which have heretofore been found the most difficult to cultivate. I have now, in a wide-mouthed bottle, simply and loosely covered with a tin lid, the following plants:—*Hymenophyllum Tunbridgense* and *Wilsoni*, *Trichomanes brevisetum*, *Hookeria lucens*, and other Mosses, *Jungermannia juniperina* and *reptans*, &c. &c. These plants have been inclosed for twelve months, and are growing most vigorously, although they have not once been watered during that period. In my other cases, the *Ferns*, *Palms*, *Orchideæ*, *Grasses*, many Monocotyledonous plants belonging to the families of *Scitamineæ*, *Bromeliaceæ*, &c. &c. grow very well; while, on the contrary, the continued humid state of the atmosphere is unfavourable to the development of the flowers of most of the *Exogenous plants*, excepting those which naturally grow in moist and shady situations, the *Linnæa borealis*, for instance, which I have had for more than two years, and which flowered twice last year in a situation where, without my protecting cases, the *London Pride (Saxifraga umbrosa)* ceases to exist after twelve or eighteen months.

This method will, I believe, assist the physiological Botanist in solving some points of great importance, connected with vegetation in general, such as the agency of various soils, the quantum of air necessary for the development of various tribes of plants, &c. &c.; and I shall be delighted in seeing the subject taken up by those, who, with far greater knowledge than I possess, have likewise better opportunities of prosecuting these interesting inquiries. Occupied, as I have unceasingly been for the last twenty years, with the harassing details of general medical practice, and living constantly in town, I find it impossible to do all that I wish, nor could I have gone on thus far, but for the unbounded liberality of Messrs. Loddiges, who from their ample stores, have most kindly furnished me with every plant I desired for the purposes of experiment.

I come now to the most important application of the above facts: that of the conveyance of plants upon long voyages. Reflecting upon the causes of the failure attending such conveyance, arising chiefly from deficiency or redundancy of water, from the spray of the sea, or from the want of light in protecting them from the spray, it was, of course, evident that my new method offered a ready means of obviating all these difficulties, and in the beginning of June, 1833, I filled two cases with Ferns, Grasses, &c., and sent them to Sydney under the care of my zealous friend, Captain Mallard, copies of whose letters I have enclosed.

The cases were refilled at Sydney, in the month of February, 1834, the thermometer then being between 90° and 100°. In their passage to England, they encountered very varying temperatures. The thermometer fell to 20° in rounding Cape Horn, and the decks were covered a foot deep with snow. In crossing the line the thermometer rose to 120°, and fell to 40° on their arrival in the British channel, in the beginning of November, eight months after they were enclosed. These plants were not once watered during their voyage, received no protection by day or by night, but were yet taken out at Loddiges' in the most healthy and vigorous condition. The plants chiefly consisted of Ferns, among them *Gleichenia microphylla* never before introduced alive, and the *Hymenophyllum Tunbridgense*. Several plants of *Callicoma serrata* had come up from seed during the voyage, and were in a very healthy state. As this experiment was made chiefly with *Ferns*, I will briefly give you an account of one other experiment, in which plants of a higher order of development were the subject of trial. Ibrahim Pacha being desirous to obtain useful and ornamental plants for his garden near Cairo, and at Damascus, commissioned his agents in this country to send them. I was requested by his agents to select them, and they were sent out in August, 1834, in the Nile Steamer, to Alexandria. They were about two months on their passage, and I have enclosed a copy of the letter from Mr. Traill, his gardener, giving an account of their condition when he received them; and have likewise sent you a list of the plants, which were contained in the Egyptian cases. I have, as yet, received no account of the Syrian plants. Various other trials have been made to other parts of the world, as Calcutta, Para, &c. &c., and with the same success.

I feel well assured that this method of importing plants would likewise be extremely useful in the introdcution of many of the lower but most interesting tribes of animals, which have never yet been seen alive in this country.

In reply to an inquiry that was addressed to Mr. Ward, as to the advisability of a collector's taking glazed boxes to Brazil, Mr. Ward thus writes. "I should imagine that these may be easily procured at Rio, and various other places; but if glass cannot be obtained, or is very dear, then a number of small panes might be carried, for use, as occasion requires.

"It may be as well to state, once for all, that the success of my plan is in exact proportion to the admission of light to all parts of the growing plants, and to the due regulation of the humidity of the mould wherein they grow. It is safer, in all instances, to give rather too little than too much water. If *Ferns*, for example, are the subject of experiment, they should be planted in the soil most congenial to them, well watered, but all the superfluous fluid allowed to drain off, before the case is finally closed; while on the other hand, succulent plants should be set in dry sand. I need not, however, dilate upon this, any further than by observing that the natural condition of the species should be imitated, as far as possible, except in the free exposure to air. The smaller species of *Cacti* will travel well, suspended in my cases, without any mould. The larger species, according to Loddiges, should be packed in very fine and dry sand. All vegetable matters, used as package, are very injurious.

"You ask how the tropical *Orchideæ* may be best conveyed:—most certainly in the glazed cases: I believe, that, thus secured, ninety-five out of every hundred may be imported in a vigorous state from any part of the world, provided the voyage does not exceed eight or ten months in duration.

"In all instances, the plants require no attention during the voyage; the sole care requisite being to keep them in the light.

"You next enquire, what plan I would suggest, where glazed boxes are not procurable, and here I must give you higher authority than my own, that of Messrs. Loddiges, who find the means adopted by your American correspondent, the most eligible, viz., that of packing them in moderately moist *Sphagna*;—always excepting the succulent plants.

"Would it not be advisable to direct the attention of your collector, particularly, to the introduction of such plants as have never yet been seen alive in this country, owing to the impossibility of importing them in the old method? Every species of *Trichomanes* and *Hymenophyllum* might thus become inmates of our stoves, as well as a number of other interesting plants, which possess oily nuts or seeds, that quickly lose their germinating property, after they are ripe. These seeds might be sown in the mould among the other plants, and would come up during the voyage. All the *Palms* and *Bertholletia*, &c. would succeed admirably in this way.

"I may remark, that there is one point, upon which misconception exists very generally, even among well informed men. Because my cases are made quite tight, it is imagined, that the plants contained in them receive no change of air. Now, it must be obvious to every one who reflects for an instant on the subject, that owing to the expansibility of the air by heat, there must, with every change of temperature, be a corresponding change in the volume of air contained within the cases. Without such a variation, the plants would, in all probability, soon perish."

N. B. Ward.

Hobart Town, Nov. 23, 1833.

Sir,—You will, I am sure, be much pleased to hear, that your experiment for the preservation of plants alive, without the necessity of water, or open exposure to the air, has *fully succeeded*, The two boxes entrusted to my care, containing ferns, mosses, grasses, &c., are now on the poop of the ship (where they have been all the voyage), and the plants (with the exception of two or three ferns, which appear to have faded) are all *alive* and *vigorous*.

During the very hot weather near the equator, I gave them once a light sprinkling of water; and that is all they have received during the passage.

All the plants have grown a great deal, particularly the grasses, which have been attempting to push the top of the box off.

I shall carry them forward to Sydney, according to your instructions, and have no doubt of delivering them into the hands of Mr. Cunningham in the same flourishing state as they are at present.

Allow me, in conclusion, to offer you my warm congratulations upon the success of this simple but beautiful discovery for the preservation of plants in the living state upon the longest voyages; and I feel not a little pride in having been the instrument by which the truth of your new principle has been fully proved by experiment.

I am, Sir, &c. &c.
CHARLES MALLARD.

Barque Persian, at Sydney, Jan. 18th, 1834.

Sir,—I have the happiness to inform you, that the plants (ferns, mosses, &c.) contained in the two glazed cases entrusted to my care, were landed here at the Botanical Garden, about three weeks ago, nearly the whole of them alive and flourishing. They have since been transplanted by Mr. M'Lean, who has charge of the garden in the absence of Mr. Cunningham (gone to New Zealand botanizing), and are all doing well.

The complete success of your interesting experiment has been decidedly proved; and whilst offering you my congratulations upon this agreeable result, I cannot but feel some little degree of pride and pleasure in having been the instrument selected to put to the proof so important a discovery to the botanical world,

I am, Sir, &c. &c,
CHARLES MALLARD.

P. S, I ought to have mentioned that, during the voyage, the plants were watered but once, and that but a light sprinkling near the equator, and were on deck (on the poop) the whole passage.

Cairo, April 30, 1835.

Sir,—I beg to acknowledge the receipt of your letter of 2d ultimo, wherein you request information as to the state of the plants sent out by you in the Nile steamer. The collection consisted, I believe, of 172 species, contained in six glazed cases, two of which only were forwarded to me from Alexandria. The one which you mention as having been fitted up with talc, together with three others, were sent on to Syria immediately on their arrival in Alexandria, so that I had no opportunity of seeing them.

I have, however, the pleasure to inform you, that the Egyptian portion of the collection was received here in the very best condition: the plants, when removed from the cases, did not appear to have suffered in the slightest degree; they were in a perfectly fresh and vigorous state, and, in fact, hardly a leaf had been lost during their passage. Your plan, I think decidedly a good one, and ought to be made generally known.

I am, Sir, &c. &c.
J. Traill.

List of plants contained in the two cases sent to Egypt.

Achras Sapota.
Aleurites triloba.
Alpinia nutans.
Anona Cherimoyer.
Bignonia venusta.
Bombax Gossypium.
Brexia spinosa.
Caryota urens.
Cedrela odorata.
Combretum comosum.
Croton variegatum.
Curcuma longa.
Cycas revoluta.
Dalbergia scandens.
Dimocarpus Litchi.
Diospyros cordifolia.
Diospyros edulis.
Diospyros embryopteris.
Doryanthes excelsa.
Dracæna edulis.
Dracæna terminalis.
Erythrina crista-galli.
Ficus elastica.
Flacourtia cataphracta.
Franciscea uniflora.
Gomutus saccharifer.
Jatropha panduræfolia.
Jonesia pinnata.
Ixora coccinea.
Latania borbonica.
Laurus Cassia.
Laurus Cinnamomum.
Maranta arundinacea.
Maranta zebrina.
Maranta bicolor.
Melastoma Fothergilli.
MenispermumCocculus.
Melaleuca cajeputi.
Mimusops Elengi.
Morus tinctoria.
Myrtus Pimenta.
Oreodoxia regia.
Pandanus odoratissimus.
Passiflora racemosa.
Piper Betel.
Piper nigrum.
Psidium chinense.
Terminalia angustifolia.
Uvaria odoratissima.
Vanilla planifolia.
Zingiber officinale.

2.—*Notes on the Drugs called Mishme Teeta and Pucha Pat.*

By N. Wallich, M. D.

About a year ago I received from Captain Jenkins, Agent to the Governor General on the N. E. Frontiers of Bengal, a small supply of a medicinal root, which he informed me was in great repute in Assam, and among the tribes inhabiting the adjoining countries. I have since been able, through the kindness of Lieut. Charlton, of Suddeya in Upper Assam, to determine with certainty the nature of the plant which yields this root; and I have now the pleasure to submit some notes on the subject to the Medical and Physical Society, together with the result of the experiments made by my valued friend Mr. Twining, to ascertain the properties and medicinal use of the drug.

Mishme Teeta is the name by which this drug is designated among the Mishmees and Lamas in the mountainous regions bordering upon Upper Assam. The Chinese call it *Honglane.* Among these three nations, it is in great estimation, and in universal use as a powerful tonic and stomachic. Quantities are sent down to Assam in neat little baskets, with open meshes, made of narrow slips of ratan, or some such material, and measuring 3 to 4 inches in length by 2½ in breadth and 1½ in width. Each basket contains about an ounce of small pieces of the root, from 1 to 3 inches long; they are nearly cylindric, uneven, scabrous, more or less curved, of a greyish brown colour, and varying in thickness from the size of a crow-quill, to double that diameter. The root is perfectly dry and brittle; occasionally a few fibrillæ are issuing from one end; the inside is hard, somewhat cellular, the outside of a dingy yellow colour. The taste is intensely and purely bitter, very lasting and with only a very slight aroma; on mastication, the root tinges the saliva yellow; its interior is bright-yellow or gold-colored. It possesses no smell whatever.

In March last, I received from Lieut. Charlton some fresh roots with leaves attached, which he had obligingly procured for me from the hills. They are still alive, and in a healthy condition, notwithstanding the great disparity of climate which they have to endure in Bengal, chiefly in regard to temperature. The leaves have withered away; but fresh roots are at the present time making their appearance. I am therefore not without some hopes of preserving this valuable plant in the Honorable Company's Botanic Garden; or at any rate of introducing it hereafter into localities where it may have a better chance of thriving. I have subsequently had the pleasure of obtaining from the same liberal source two incomplete specimens of the inflorescence together with unripe fruit, produced by the plants at Suddeya. These are the materials from which the following brief notes have been taken.

Coptis Teeta, foliis trisectis, segmentis petiolatis, lobato-pinnatifidis, lobis incisis acutissime setaceo-serratis; scapo paucifloro, bracteis foliaceis line-ari tripartitis.

Radix subcarnosa, multiceps, fibrillosa, intus luteo-aurea. Surculus ....? Folia erecta, glabra, longe petiolata, texturâ firmâ et rigidiusculâ, habituque frondem filicis cujusdem dorsiferæ referentia; circumscriptione ovato-cordata, attenuato-acuminata, quadripollicaria; segmenta petiolo partiali ½ pollicari suffulta, lateralia semi-cordato-ovata, extus fere bipartita, pollices duos longa; intermedium duplo majus, paullo longius petiolatum, attenuatum in acumen, basi cuneatâ subdecurrente: omnia inciso-pinnatifida, lobis obtusis, serraturis latiusculis setâ terminatis, reticulata, nervis supra puberulis, venis extimis curvato-furcatis. Petiolus gracilis, longitudine circiter folii, basi dilatatus. Scapus teres, erectus, tenuis, striatulus, folia longitudine æquans, apice gerens flores paucos (vix ultra tres) parvos, alternos, pedunculatos. Sepala oblongo-lanceolata, attenuata, acuta, albida, parallele venulosa, glabra, unguem longa, fugacissima. Petala lineari-ligulata, obtusa sepalis triplo breviora, planiuscula (?) Stamina pistillaque plura; antheræ planorotundatæ, albidæ. Carpella immatura membranacea, 3-5-ovulata, breve stipitata, stylo terminata carnoso subcylindrico, æquante, adscendente-recurvato, intus (stigmate) scabrido. Bractea sub singulo pedunculo foliacea, angusto-linearis, serraturis setaceis marginata, infima tripartita. Pedunculi fructiferi elongati.

Coptis belongs to the subdivision of Ranunculaceæ, called Helleboreæ. It consists of three species: namely, *C. Teeta*, and the two following.

C. trifolia, Salisb. in Linn. Trans. vol. viii. p. 305; Bigelow, Amer. Med. Botany, vol. i. p. 60, t. 5; Decand. Syst. Veg. vol. i. p. 322 et Prodr. vol. i. p. 47; Lodd. Bot. Cab. 2. n. 173. *Helleborus trifolius*, Linn. Amoen. Acad. vol. ii. p. 355. tab. 4, fig. 18. *Anemone Groenlandica*, Müll. Flor. Dan. vol. vi. p. 5. tab. 166.

This is a native of the most northern parts of Europe and of North America, and is quite distinct from our plant by its rounded obovate leaflets.

C. asplenifolia, Salisb. loc. cit. p. 306; Pursh. Flor. Boreal. Amer. vol. ii. p. 39; Decand. locis cit.; Smith in Cyclop. Rees, vol. xix. ad calcem vocis Isopyri, quo teste *Thalictrum japonicum*, Thunb. in Act. Soc. Linn. vol. ii. p. 337, et *DidynamistaSalviæ similis*, Ejusd. Flor. Japon. p. 364, num. 43 (inter plantas obscuras) huc pertinent.

A native of the west coast of North America, where it was found by my venerable friend Mr. Archibald Menzies, who is, I believe the only survivor of the party that accompanied Captain Vancouver in his voyage round the world. It has also been found in Japan, according

to Thunberg. The plant comes near to Coptis Teeta, agreeing with it in the fern-like appearance of the leaves, from whence it derives its name, and which indeed at first deceived me into a supposition of ours being a member of that tribe.

The nearest allied genus is *Isopyrum*, of which Mr. Royle's very valuable and important work, Illustrations of the Botany of the Himalaya, contains descriptions and figures of two species; namely *Isopyrum grandiflorum* Fischer, Royle Illustr. p. 55, t. 11. fig. 3, from Kunnawur; and *I. microphyllum* Royle, loc. cit. fig. 4, (tab. 1 being quoted by mistake in both instances for tab. 11), from Buddrinath, where it was found by the plant-collectors employed under me.

As it is very probable that the medicinal properties of Mishme Teeta will be found to agree with those of the *Gold-thread* of North America (Coptis trifolia), so called from the colour of the root, I extract in this place the following interesting account from Professor Bigelow's work quoted above, p. 62.

" The root of this plant is a pure intense bitter, scarcely modified by any other taste. In distillation it communicates no decided sensible quality to water. The constituent with which it most abounds is a bitter extractive matter, soluble both in water and alcohol. It seems destitute of resinous or gummy portions, since the residuum from an evaporated solution in alcohol is readily dissolved in water, and vice versâ. It is devoid of astringency when chewed in the mouth, and it gives no indication of the presence of tannin or gallic acid when tested with animal gelatin, or with sulphate of iron. The abundance of the bitter principle is evinced by the acetate of lead and nitrate of silver, both of which throw down a copious precipitate. The sulphuric, nitric, and muriatic acids occasion no change, and the muriate of tin gives only a slight precipitate, after some time standing.

"Of this article larger quantities are sold in the druggists' shops in Boston, than of almost any indigenous production. The demand for it arises from its supposed efficacy as a local application in aphthous, and other ulcerations of the mouth. Its reputation, however, in these cases is wholly unmerited, since it possesses no astringent or stimulating quality, by which it can act on the ulcerated spots; and where benefit has attended its use, it is doubtless to be ascribed to other articles possessing the above properties, with which it is usually combined.

" As a pure tonic bitter, capable of strengthening the viscera, and promoting digestion, it is entitled to rank with most articles of that kind now in use. Its character resembles that of Gentian, Quassia, and Columbo, being a simple bitter without aroma or astringency. The tincture, made by digesting half an ounce of the bruised root in eight ounces of diluted alcohol, forms a preparation of a fine yellow colour, possessing the whole bitterness of the plant. I have given it in various instances to dyspeptics and convalescents, who have generally expressed satisfaction from its effects, at least, as frequently as from other medicines of its class. A tea-spoonful may be taken three times a day. In substance it rests well on the stomach in doses of ten or twenty grains. It is, however, difficult to reduce to powder, on account of the tenacity of its fibres."

I shall now advert to another vegetable substance which, although most extensively used by the natives of this country, has hitherto continued one of the problems in our Indian Materia Medica. The drug, to which I allude, is called in Bengalee as well as in Hindee, *Puchá Pát*, and is found in every bazar almost throughout Hindustan. My esteemed friend Baboo Radhakant Deb informs me, that "there exists no Sanscrita name for this leaf, which is largely imported by Mogul merchants; that it is used as an ingredient in tobacco for smoking, and for scenting the hair of women, and that the essential oil is in common use for imparting the peculiar fragrance of the leaf to clothes among the superior classes of natives." I believe that the people of the peninsula are peculiarly fond of this perfume, as are also the Roman Catholic inhabitants of this country generally.

Having ascertained, on my return from Europe two years ago, that a large quantity of what appeared to be the same drug as that commonly sold in the bazars under the name of Puchá Pát had been imported from Penang, I requested Mr. George Porter, late of that island, and formerly in charge of the botanical establishment there, to favour me with an account of the article, and also, if possible, with some growing plants of it. In February last year (1834), I had the pleasure to receive from him several plants, which I have succeeded in multiplying by cuttings, and which appear to thrive remarkably well in this garden. Mr. Porter has furnished me with the following memorandum: "The Puchá Pát grows perfectly wild at Penang, and on the opposite shore of the Malay Peninsula, in Wellesley province. The Arabs use and export it more than any other nation. Their annual pilgrim ship takes up an immense quantity of the leaf. They use it principally for stuffing matrasses and pillows, and assert, that it is very efficacious in preventing contagion and prolonging life. It requires no sort of preparation, being simply gathered and dried in the sun; too much drying, however, is hurtful, in as much as it renders the leaf liable to crumble to dust in packing and stowing on board. In Penang it sells at the rate of a dollar and a quarter, to a dollar and a half, per pekul. In Bengal, some which was sent from thence several years ago, sold at 11 rupees 8 annas per maund. At times the price is much higher. The last investment sold so low as six rupees only per maund. It has not been seen in flower." So far Mr. Porter's memorandum.

The Puchá Pát plant is evidently of the family of Labiatæ. It forms a shrub (in the Botanical Garden) of two to three feet in height. The obtusely four-cornered branches and the leaves are juicy, and somewhat fleshy, and covered, especially the inferior surface of the latter, with a great deal of soft, pallid pubescence, which gives the plant a greyish appearance. All the young parts are densely villous. The leaves are opposite, petioled, ovate, obtuse, grossly and obtusely lobato-crenate, measuring from two to four inches; the lowermost on the branches are subcordate, all the others are cuneate, and entire at the base; the upper surface slightly rugose; under surface pallid, with very thick rib and nerves, and largely reticulated veins.

None of the individuals in this garden have hitherto shown any disposition to blossom; owing perhaps to the plant being so easily multiplied by division. All the green parts, on being rubbed, emit the peculiar smell of the drug sold under the name of Pucha Pát, which is also very like our shrub in the form, margins, and surface of the leaves.

I should have mentioned above, that the Baron Hügel informs me, that he has found a plant growing wild at Canton, which closely resembles that from Penang cultivated in this garden.

Whether *Marrubium odoratissimum Betonicæ folio*, J. Burm. Thesaur. Zeylan. p. 153, tab. 71, fig. 1, (*Marrubium Indicum*, N. L. Burman, Flor. Ind. p. 127), be our plant or not, it is difficult to say; but it strikes me that there is at least a considerable affinity between them.

H. C. Botanic Garden, 6th June, 1835.

Note on the Medicinal Properties of the root of the Mishme Teeta.—

By W. Twining, Esq.

The powder of this root is of an intensely bitter taste, which is accompanied with a slight degree of a peculiar aroma. The sensation produced in the mouth subsides but slowly, and is more pleasant than any simple bitter. Judging from the taste, it does not possess much astringency; and this opinion is confirmed, by finding that neither the tincture nor the infusion is much affected by the solution of sulphate of iron. Four hundred and eighty grains of the root, when coarsely powdered, and macerated in proof spirit for five days, were found to have lost 180 grains. The residue of the above tincture, when dried, amounting to 300 grains, was macerated for 30 hours in distilled water, and only 26 grains were found soluble in water; as the residuum, when dried, weighed 174 grains. The maceration in water was not continued longer than 30 hours, because fermentation had commenced, the weather being very hot at the latter end of May.

If we may be allowed to pronounce an opinion after trying the effects of the powder, and of the tincture, in 17 persons, this medicine is highly deserving of attention. The persons on whom the trials were made were chiefly patients who were suffering from different degrees of debility, after the subsidence of acute diseases; and one was a patient who was of a scrofulous habit, and reduced to the lowest stage of debility, by external suppuration of great extent. The effects of this medicine as a bitter, and its influence in restoring appetite and increasing the digestive powers, are very remarkable, and it may be said to possess all the properties of our best bitter tonics. It has seldom appeared to have the effect of constipating the bowels; but in this and many other respects, I consider further trials necessary to ascertain fully the medicinal properties of this drug.—*Transactions of the Medical and Physical Society of Calcutta*, Vol. VIII. Part I.

Calcutta, 5th June, 1835.

Notes on Cassia Lanceolata, or the Plant which yields the true Senna Leaves of the Calcutta Bazars—By N. Wallich, Esq., M. D.

Cassia Lanceolata, Forskäl, Flor. Ægypt. Arab. p. 85.—Lamarck, Encycl. Bot. vol. 1. p. 646, t. 332, f. 3.—Colladon, Hist. Nat, et Med. des Casses, p. 93, t. 15, f. C.—De Candolle, Prodr. Syst. Nat. Regn. Veg. vol. 2, p. 492.—Linnei Syst. Veg. cur. Sprengel, vol. 2. p. 339.—Nees von Esenbeck and Ebermaier, Handb. der Med. Pharmac. Bot. vol. 3. p. 205—Wallich, Cat. Herb. Ind. Or. n. 5318[*]. c. (in folio 204).

Cassiæ species angustifoliæ et ligustrinæ prox. Herb. Madrasp. Wall. loc. cit. a.—*Cassia ligustrinoides*, Herb. Wightian. Ibid b.

Cassia acutifolia, De Lile in Descr. de L'Egypte, Hist. Nat. tom. 2. Botanique, p. 219, t. 27, f. 1.

Senna officinalis, Gærtner de fruct. et semin. vol, 2, p. 312, t. 146.

Cassia Senna, Roxburgh, Hort. Beng. p. 31.—Ainslie, Mat. Med. of Hindoost. p. 43, (2d edition, vol. 1. p. 390; vol. ii, p. 249).

Senna Leaves, Fleming, Cat. of Ind. Med. Plants and Drugs, in Asiatic Researches, vol. ii. p. 109.

The above synonymy might easily have been enlarged to a much greater extent, if my object had been to attempt a detailed history of Senna, and of the two species of Cassia which are now known to produce that leaf. But I wish to limit these notes solely to an account of the plant which yields the drug commonly sold in the bazars throughout Hindustan, and more particularly those in Calcutta; and with this view I have confined myself to a quotation of such only, among the numerous authorities which presented themselves, as treat of the plant and drug in a more or less botanical respect, or with particular reference to this country; and even of these I have only noticed such as appeared to me of use to my brethren in the profession in India, and which I was able to consult personally. I have likewise thought it unnecessary to swell this little memoir by extracting from the works of Fleming, Ainslie, and others, what relates to the Indian names of the drug, its uses among the natives and the like; because I could have offered nothing more than a stale repetition of the information given by those authors.

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[*] By mistake I wrote Forst. instead of Forsk. in this lithographic catalogue.

It appears from Dr. Roxburgh's Hortus Bengalensis, that the plant was first introduced into the Botanic Garden of Calcutta in the year 1800, by the Rev. Dr. Carey. I am unable to say what result attended its culture at the time, but it may be concluded, from the circumstances of the plant not existing in the garden in 1808, and disappearing afterwards altogether for many years, that considerable difficulties were experienced in preserving it. In Roxburgh's valuable MS. Synopsis Floræ Indicæ the plant is introduced under the same name which it bears in the Hortus Bengalensis,—namely, *Cassia Senna;* and a specific character is added, which establishes beyond a doubt its identity with our *Cassia lanceolata.* He says, however, that the plant is " a native of the interior of India as well as Arabia, &c." of the correctness of which assertion I must express a serious doubt. In quoting Willdenow's edition of the Species Plantarum of Linnæus for his plant, a question naturally arises : which of the two, if not more, species of Cassia which are confounded there under the name of *C. Senna,* was actually meant by Dr. Roxburgh? Taking the species as he found it in Willdenow, the extensive geographical distribution to which I have alluded is, strictly speaking, true; but, as I before observed, the species which Roxburgh had before him was undoubtedly *C. lanceolata,* the true and genuine Senna plant of Asia Minor, which plant most unquestionably does not grow wild in the interior of India, nor in any part of the East Indies.

There is another species of Cassia which produces Senna leaves, and is called by Colladon *C. obovata.* It is distinct from ours, although for a long time it was confounded with it by Linnæus and others. This, too, is a native of Asia Minor; but does it not also grow in India? Both Colladon and other botanists cite Burman's *C. Senna,* which is decidedly an Indian production, as a synonyme; but I suspect they are wrong in so doing; in other words, I am inclined to consider Colladon's and Burman's plants as two different species, belonging to different countries. Roxburgh has a plant which he calls *Senna obtusa,* Flor. Ind. vol. 2, p. 344, and for which he quotes Burman's *C. Senna*; and this plant, judging from Roxburgh's excellent description as well as from its place of growth, (Seringapatam), and lastly from native specimens which I have myself had an opportunity of examining, I believe to be a distinct species from the Egyptian *C. obovata*, and which I suggest may be called *C. Burmanni*. I must observe here, that *Cassia Senna* has not been introduced into Roxburgh's printed Flora Indica, although it is inserted both in his Hortus Bengalensis and the MS. Synopsis quoted above; but his *Senna obtusa* is mentioned in all three works, (under the genus *Cassia* in the two last).

There are, then, two species of Cassia which undoubtedly produce the Senna of commerce, both being exclusively natives of Egypt and Arabia; and a third distinct species, which belongs to the continent of India, is said by Roxburgh to yield a substitute for that article. The following is a synoptical view of them all.

1. *Cassia lanceolata*, Forskäl, produces the best sort of leaves, and is the subject of my present observations.

2. *Cassia obovata*, Collad. loc. cit. p. 92, t. 15, f. 1, (with exclusion of the citation from Burman, which belongs to the following species).

3. *Cassia Burmanni*. Wall.—*C. Senna*, Burm. Fl. Ind. p. 96, t. 33, f. 2.—*Cassia vel Senna obtusa*, Roxb, locis cit.—*C. obovata*. Wight, Herb. (non Collad.) in Wall. Cat. Herb. Or. 5319 a.—*C. Senna*, Herbb. Madr. et. Heyn. Ibid. b. et. c.—*C. Senna* Hb. Russ. Ibid. d. The plant which I gathered on the banks of the Irawaddy at Paghamew (Ibid. e.) is probably this species, though I cannot speak with positive certainty, as neither my Burmese Herbarium nor my manuscript notes respecting it are with me in this country. This species has not been found in Hindustan proper. It would be very desirable to try still further the efficacy of its leaves; and I beg to recommend the subject to the consideration of those who may have the means of making the experiment.

About eight years ago I succeeded in raising a number of plants from seeds found in pods among a batch of Senna which had recently arrived from Arabia. They proved to be Forskäl's *C. lanceolata*. Some difficulties were experienced at the commencement in preserving the plants and making them produce good seeds; but they were gradually surmounted, and, we have at this time (August, 1834), several plots of land in cultivation with the species; the greatest proportion of the plants being in a healthy and vigorous condition, full of flowers, and showing successive crops of ripe pods. The unusual degree of heat during the late dry season sensibly affected some of the individuals, by causing a disease in the root which killed them during the rains; still our crop is far better than I had any ground for anticipating: a good quantity of seeds has already been obtained, and a further supply remains still to be reaped, which will enable us to raise a much larger proportion of plants next year. The mode of cultivation which has been found to answer best is to transplant the seedlings after they have acquired a height of about 6 inches, at a distance from each other of 3 feet, in slightly raised beds or patches of open ground, previously well cleansed from weeds and enriched by the addition of some vegetable mould. We sow the seeds in the month of November; germination commences in about twelve days, and the transplanting takes place in February; after which the plants grow luxuriantly, provided they are watered during the hottest days of April and May. Upon the whole, it has been found, that shading of any kind does more harm than good; and although a number of the young plants perish in their tender age from the excessive heat, yet by constantly supplying their place with fresh seedlings no sensible loss has occurred in the end from that source. The plants begin to blossom in April, and they continue producing successive crops of flowers and fruit until the cold weather begins to make its first appearance early in October, soon after which the plants die away; very few individuals surviving a second year.

Mr. Twining having with his accustomed liberality undertaken to ascertain the quality of the Senna leaf produced this year at the Botanic Garden, I am enabled to annex his very satisfactory report to this paper. It is proper, however, to observe, that the leaves furnished to that gentleman were gathered during the rainy season, in the months of July and August,—probably the most unfavourable of all for securing their active principle pure and undiluted, not only because the sap of the plant is then at its fullest rise, and necessarily modified by the continued production of flowers and fruits, but also because the drying of the leaf without the aid of artificial heat (as has been the case in the present instance), is a matter of doubtful effect. I am, therefore, warranted in saying, that had the leaves been collected in the dry weather, as I will take care they shall be next year, they would probably have proved superior to the Senna procurable in the Calcutta bazar.

Some explanation may perhaps be necessary for my offering a detailed description and coloured figure of a plant, which is already known to the world, in both respects, chiefly by the labours of De Lile in the superb French work on Egypt. But independent of the account there given being necessarily short and succinct, although illustrated by a most beautiful engraving, the work itself is so very expensive and scarce in this country (I believe it does not exist any where except in the Library of the Asiatic Society of Calcutta, at least on this side of India) that few only can have access to it. I have had the advantage of examining the plant leisurely in its various stages; and as my object is to furnish the Medical profession in India with the means of identifying a plant yielding one of the most extensively useful articles of Materia Medica, I trust I shall be excused even if I had nothing to offer but what had been furnished already from other sources.

The plant is 3 to 4, rarely 5 feet high; erect, branchy, of an elegant rounded form and aspect, and of an uniform pallid glaucous colour, corresponding well with the elegant clusters of large pale-yellow blossoms, which are produced in abundance during several months in succession; the whole forming an object of great beauty, not surpassed by any of the smaller species of the extensive and difficult genus to which it belongs. Root long, woody, tapering, perpendicular, sending forth few branches only; annual, rarely biennial. Stem cylindric, as far as an inch thick at the base, together with the thicker branches covered with a rust-coloured slightly scabrous epidermis, which on close inspection is found marked with minute parallel fissures. Branches round, pale-green, unequally and obtusely angular, very slightly flexuose towards their end, which, as well as the leaves, are glaucous and perfectly opaque; while young there are a few short sub-adpressed hairs on both sides of the leaflets as well as on the branches, which disappear by age. Tender shoots covered with much grey pubescence. Leaves petioled, pinnate, spreading, 1 or 2 inches distant from each other, scattered, from 6 to 10 inches long. Common petiol cylindric, slender, about 2 inches long, with a narrow furrow on the upper side; its base swelled and gibbous below. About the middle on the upper side, across the furrow, is seen a slightly elevated line covered with short, minute, brown evanescent hairs; this is also the case between the opposite leaflets on the slender, straight rachis, which ends under the terminal pair of pinnæ with a short, small and deciduous cuspis. Pinnæ exactly opposite, in 6 to 10 pairs, spreading, 1½ to 2 inches long, slightly increasing in length from the base of the compound leaf to its apex, narrow or linear-lanceolate, tapering-acute, the midrib ending in a very minute point, margins gently decurved, base a little unequal, the upper half being acute, the lower a little broader and blunt; of a thickish, almost fleshy brittle texture, flat, very pallid and glaucous; both sides, especially the lower, have a number of minute adpressed short hairs, which disappear by age; the upper side is marked with some oblique capillary nerves, the lower by a very slender whitish rib. Partial petiols very short, measuring scarcely a line in length, cylindric. Stipules small, fleshy, opposite, spreading and recurved, withering, lanceolate, acute channelled, smooth, with an oblique semicordate base, the outer side of which is thicker than the rest, rounded, concave below; within the base are a number of black, short, subulate loosely attached and deciduous hairs or ciliæ. Racemes solitary in all the upper axils, peduncled, erect, somewhat incurved, as long as the leaves, bearing about 20 large bright yellow or gold-coloured, inodorous, short pedicelled flowers. Common peduncle one-third longer, and considerably thicker than the petiol, cylindric; rachis somewhat flattened and waved; pedicels one-flowered, very short, with a joint at the middle, and thence thickening and clavate. Bracte exceedingly thin, membranous, pellucid, obovate, obtuse, concave, embracing the oblong and obtuse flower bud with its pedicel, adnate at the broadish base, falling off before expansion takes place. Calycine segments oblong, obtuse, concave, about ⅜ of an inch long, very thin and delicate, recurved, caducous. Corolla of an uniform pale-yellow gold colour, spreading, twice as long as the calyx; petals unequal, caducous; the uppermost oblong-cuneate, sessile; the others obovate, and supported on very short claws; ¾ of an inch long, many times broader than the setals; they are all obtuse, somewhat triplinerved, finely reticulated on the outer surface, with slightly elevated nerves and veins. Anthers very unequal, of two kinds; three sterile ones very short and small, placed under the narrow upper petal, subsagittate, retuse; seven are fertile, linear, with sagittate bases and oblique biporous apex; of these, five are straight, much longer than the former; the one under the pistil has a longer filament than the others; two are curved and very long, reaching above the middle of the lateral petals. Pistil curved, longer than the stamens; ovary linear, covered with grey adpressed pubescence, margins swelled, the sides marked by eight little protuberances caused by the ovules; base supported by a short, fleshy, pubescent pedicel; style bent downwards, cylindric, except at the base, which is slightly compressed; stigma minute, acute. Pod oblong, flat, almost foliaceous, pendulous, before maturity glaucous, and with a number of short adpressed hairs, afterwards almost smooth, of a dark brown colour, shining on the bloom being rubbed off; 1¾ inch long by ¾ in breadth; oblong, slightly curved or scymetar-shaped; one of the finely elevated margins being longitudinally convex, the other concave; very obtuse and obliquely cuspidulate at the end; base rounded, and supported by a short pedicel; sides a little elevated along the middle, and marked across by slight swellings and depressions caused by the seeds; a number of parallel approximate capillary veins, originating from the marginal nerve, run obliquely across the sides towards the middle, forming reticulated anastomoses there as well as along their course by means of lateral veins. Valves flat, pale-ferruginous and a little pitted within. Dissepiments extremely thin and narrow, vanishing towards the margins. Seeds mostly eight, of a greenish-grey colour, shining, solitary in each cell between the dissepiments, flattened, triangular, obcordate, about four lines long; their base contracted into a short thick obtuse beak, from which a ridge ascends on each side towards the middle; the sides as well as the thick margins are scabrous from numerous unequal small protuberances. Funicle long, transversal, a little adscending, capillary, originating from the concave margin of the pod, and inserted into one side of the beak of the seed, disappearing on the latter coming to maturity. The interior structure, indeed the whole pod, corresponds entirely with the accurate description and figure given in Gærtner's work, quoted at the beginning of this paper.—*Transactions of the Medical and Physical Society of Calcutta,* Vol. VIII. Part 1.

NOTE.

I beg to refer the reader to Mr. Royle's valuable *Illustrations of the Botany of the Himalayan Mountains,* p. 186 to 188, and again p. 201, Tab. 37, for very important and interesting information respecting the plant and drug which form the subject of the above paper. It arrived in India long after I had presented my notes to the Medical Society, otherwise I should have given these substantial value by copious extracts from my highly esteemed friend's masterly work. His very accurate figure of the plant supersedes entirely the necessity of any being added to this paper.

N. W.

H. C. Bot. Garden, 7th Nov. 1838.

Addenda to the foregoing by DR. WIGHT; *being practical remarks on the Culture and Preparation of Senna in the Madras territories.*

MADRAS, *March,* 1837.

MY DEAR SIR,—As you requested, I have looked carefully over Dr. Wallich's notes on the *Cassia lanceolata.* With the exception of a few brief instructions for cultivation, I find it a purely botanical account, examining first the synonymy, and concluding with a minute and accurate description of the plant itself. A paper of that kind, coming as it does from the Magnus Apollo of Indian Botanists, leaves, so far as it goes, no room for remark. Since, however, it is your intention to reprint it in the *Madras Journal,* the following additions may prove useful to those, who either are, already, engaged in its cultivation, or who may contemplate speculating in that way: and here I may remark that, considering the ease and certainty with which this drug can be raised and prepared for the market, and its vast consumption both in India and Europe, it seems to promise a very large return to the speculator. The consumption in Europe alone is stated by Mr. Royle, (*Illustrations of Botany, &c.*), to amount to four millions of pounds, that of India it may be difficult to determine, but it is well known that the natives are in the habit of using largely the indigenous, broad pointed leaved kind, though said to be much inferior, which would, as a matter of course, give place to the better sort, if as easily procurable. This I think would soon be the case, if the cultivation was extended, as it has already become so completely naturalized in the Tinnevelly district, as to be met with, in many places, as a common weed. It possesses besides the power of resisting heat and drought to an astonishing extent. I have seen it, during the hottest season, in full bloom and luxuriance, on old stone walls, and on soils so dry that no other herbaceous plant could survive, and where vegetation, in the arboreous plants, seemed nearly, if not altogether, arrested by the heat and long prevalence of strong land-winds. This fact (as shall be afterwards shown) is well worthy of attention.

In Tinnevelly, the only district, I believe, in Southern India, where it is cultivated to any extent, the soil employed is of a grey alluvial kind, or such as, at some former period, has been under wet cultivation, consisting of a mixture of sand and clay. I also saw a field of it in the bed of an old tank, the soil of which was such as above described.

The ground is first well ploughed, to loosen it thoroughly, and clear it from weeds. The sowing usually commences in December, towards the end of the rains, to give the seed the advantage of the last showers of the season to make it vegetate. It is sown in rows about 18 inches or two feet apart, by dropping two or three seeds into holes about an inch deep, and a foot and half distant from each other. If rain falls, nothing further is required; if not, they are watered two or three times to promote germination.

When the plants have attained the height of two or three inches, the ground is loosened about the roots and well weeded. Should the season prove very dry, and vegetation seem to flag, they are again watered: the rule being, that the larger the leaves the better the quality; hence they are classed into first, second, and third sorts, according to that criterion. In about six months the leaves are considered fit for gathering, which is known by the spike of flowers being produced, but the flowers not yet opened. Three gatherings are taken, the two last at intervals of ten or twelve days; when the crop is finished, and the plants no longer considered capable of producing a marketable article; they are then allowed to ripen their seeds for next season. Some skill is required in gathering, to effect that operation economically, and at the same time without injuring the plants. The Senna bears a pinnate leaf, that is, one having a centre stalk with a number of leaflets (6 to 10) on each side. The object is to remove these, leaving the stalk attached to the bush. To accomplish this the lower end of the stalk is gently laid hold of, from below, between the finger and thumb, and the leaflets stripped off into the hand, by drawing the fingers along the stalk. In this way the bushes are rapidly cleared of their foliage, and no unintentional admixture of pods or other impurities can possibly occur. In about twelve days the second crop of leaves is fit for gathering, and in twelve or fourteen days more, the third and last is plucked.

The most important part of the process yet remains—that of drying—for, unless properly dried, both its commercial value and medicinal properties are deteriorated. Two methods have been tried, namely, exposure to the heat of the sun and to a current of air in a dark room. The former is said to be the method pursued in Egypt, the latter is the plan adopted in Tinnevelly; at least so I was told, but, at the same time, with such evident reluctance, as to leave a doubt on my mind of its being really a true statement. I have now, however, no doubt on the subject, for, on examining two specimens, one from Bombay, the other from Tinnevelly, the difference was such as to prove, not only the truth of the statement, but the infinite superiority of sun dried leaves. The colour of the Bombay or Egyptian sample was a very pale green, nearly white, the leaves narrow, thick and leathery, or coriaceous, somewhat brittle, and having the smell of well prepared hay. The Tinnevelly one, was of a light pea green colour, very thin, membranous (from excessive luxuriance ?), flexible, and having a sour, vinegar-like smell, as if it had undergone the acetous fermentation while drying. Another indication of the same thing may be found in the great loss of weight the latter sustains in keeping. Again—samples of two sorts of Senna raised in this country from Tinnevelly seed, the one dried in the shade, the other in the sun, were infused in equal quantities of boiling water; the former produced a pale, the latter a deep purplish brown, infusion, corresponding in these respects with infusions of Tinnevelly and Egyptian samples. The former is less active, soon decomposes and acquires a sour smell and a muddy opaque colour, while the other retains for many days, under similar circumstances, its transparency, and without undergoing decomposition. These facts, I think, are quite conclusive, and show, in a striking point of view, the advantages of sun drying, considered in relation to medicinal properties only. But that is not all, it is well known that Egyptian Senna is largely adulterated, but is notwithstanding a more efficient medicine than the pure Tinnevelly drug, a difference, which the preceding experiments prove to be, partly at least, attributable to the mode of drying, though other circumstances may contribute to produce this effect. Is the difference altogether attributable to the mode of preparation ? or partly to the Egyptian Senna being adulterated with more-active ingredients ? or to the operation of some other cause yet undiscovered ?

These are questions of importance, and merit the fullest investigation, both in a medical and commercial point of view. If the comparative inactivity of the Tinnevelly Senna is owing to the first cause, the cure is simple, and the advantages, commercially, very great, since the cost of preparation, both in time and outlay, must be materially lessened by the rapid and unexpensive process of sun drying, as compared with the slow and more costly one of fitting up dark apartments. If it is in any degree owing to the admixture of other kinds of Senna leaves, we have an indigenous species to supply them; and, lastly, if owing to the quality of the soil or culture, the subject still remains for investigation.

I shall now make some remarks on what I consider the defective points of the Tinnevelly mode of cultivation, and suggest some alterations tending to diminish the cost of production, and probably to improve the quality of the produce.

The lands appropriated in that district to the culture of Senna, are of a very expensive description, while it does not by any means appear certain that they are the best, since, by giving a tendency to excessive luxuriance, it is probable the due elaboration of the active principles of the plant is prevented, and mucilage formed; to which its diminished activity and greater tendency to fermentation may be mainly owing. Bearing in mind its power of resisting heat and drought, it will perhaps on this account be found, that the much cheaper, light sandy soils of the sea coast, and along the banks of rivers (now extensively appropriated to the cultivation of Indigo) are better adapted for its culture. The similarity, indeed, in many respects, of the Indigo plant is such, as to give us reason to believe, that any soil found suitable for it, will answer for Senna. Commercially speaking, it is of importance to determine, whether the drug produced on cheap and easily wrought soils, has its active properties increased or diminished. I would, therefore, recommend attention to this subject, since, if the former is found to be the case, it will probably materially diminish the cost, and fit it for the consumption of the Indian markets. The Tinnevelly Senna being nearly 500 per cent. dearer than the Egyptian or bazar Senna.

I have mentioned above that only one crop, of three gatherings, lasting through a period of about one month, is procured from each plant, after which it is no longer considered fit to produce a marketable article. Mr. Royle informs us that he raised at Seharunpore some plants from seed picked from a parcel of bazar Senna. A figure of the plant, proves its identity with the one cultivated in Tinnevelly, while its medicinal properties were ascertained by experiment, to be equal to the best any where grown. He, in collecting the crop, in place of gathering the leaves as practised here, cut down the whole bush. Some sown early (in March) " were cut down three different times, and always threw out a profusion of new branches, so that several crops were procured from the same plant in one season." The vegetation of some that was sown later, seemed only stopped by the accession of the cold weather. A combination of these plans might prove eminently productive, for, by sowing earlier, say in August and September, the first crop might be gathered in February or March, the plants might then be cut down, the soil slightly ploughed and manured between the rows, and watered; when a second crop might be expected about the usual time of gathering the first, according to the present practice; and, perhaps, as many as four crops might thus be obtained from the same roots, as they would be extending and strengthening after every cutting! This is the method adopted with Indigo, and I can see no reason to apprehend failure in the case of Senna, while it might be the means of effecting so great a reduction in the cost of production, as would enable it not only to compete with on equal terms, but even to undersell, the Egyptian article in this country, and, from its greater purity, give it a decided advantage in the highest market where it now brings a very high price.

In conclusion, I beg to add, that, though these notes are somewhat hurriedly written, they are not the suggestions of the moment. It is now a year since I had an opportunity of inspecting the Tinnevelly plantations, and I have since then repeatedly thought of drawing up a much more elaborate account of this cultivation than the present. Brief, however, as these hints are, I believe them amply sufficient, the simplicity of the culture of the plant, and of the preparation of the leaves, rendering more detailed instructions unnecessary: while the mere circumstance of having called attention to the subject, pointing out the advantages likely to accrue, will I hope prove an adequate stimulus to those who have the opportunity of extending the cultivation of this article of almost general consumption. India now imports perhaps not less than between three and four hundred thousand pounds weight of Senna annually, of which in 1831 she re-exported to England upwards of 200,000lbs., the whole of which she might, with ease, produce within her own territories, and mostly from lands now lying waste, and with the additional advantage, that the collection and preparation would afford employment to all classes of cultivators, at those seasons when most other field labours are at a stand.

With respect to the indigenous Senna (*Cassia Burmanni Wall.*) I fear it is not so well known as it ought to be among Europeans, since it possesses very considerable medicinal properties, and is much used by the natives; who, to increase its activity, add a small portion of castor oil to the infusion, much in the same way as we add Epsom salts. It is a common and widely distributed plant in arid pastures and wastes, but by no means a conspicuous one, from the circumstance of its lying flat on the ground. In the hope of making it somewhat better known, I shall endeavour to procure recent specimens, and prepare a figure for your next number, which is the more desirable, as it may generally be procured in almost any part of the country, and might prove a useful substitute for the more approved lance-leaved species; or may perhaps be advantageously combined, as in Egypt, on the well known principle, that two medicines, possessing similar properties, act better in combination than either separately. Leaving this point, however, to be settled by those who have opportunities of subjecting both kinds to the test of experiment,

I remain, &c.
ROBERT WIGHT.

To R. COLE, Esq. SEC., &c.

ON THE AMERICAN SUMACH.[*]

The American Sumach, of which an experimental cargo is now on its passage to Liverpool, is the product of a tree which grows abundantly in many parts of South America, and possesses properties which render it decidedly more valuable, both to the Dyer and Tanner, than either Oak Bark, Catechu, Kino, Sumach, or the best Aleppo Galls. It contains, according to the able and scientific analysis of Mr. Samuel Rootsey, of Bristol, on a mean of two experiments, 76.25 per cent. of soluble or extractive matter, while Galls yield only 59.166645, Sumach (common) 40, Kino 40.4167, Catechu 67.08335, and British Oak Bark 30 per cent. Its most important constituent, however, in a commercial point of view, is *tannin*, or that principle which, by its union with animal matter, constitutes leather, of which the same experiments shew it to contain a mean of 51.1680 per cent. while the best Aleppo Galls yielded only 35.45835 per cent., Sumach 0.95834, or less than 1 per cent. and the best British Bark 13.4167 per cent. A tabular view of the results of Mr. Rootsey's experiments may be seen in Jameson's Edinburgh Philosophical Journal, and an abstract of these results in the Gardener's Magazine for August, 1834, under the name of *Dividivi.*

The substance has been largely and profitably employed in the tannery of Mr. John Nethersole, near Kingston, Jamaica, for some years past; and, from trials which have been made in England by skilful professional Tanners, it has been ascertained that one part of the American Sumach is equal to four pounds of the best British Oak Bark, and tans the leather in two-thirds less time; whence there results a gain of not only two-thirds of materials, but also of two-thirds of time. To the Dyer it will prove still more valuable—while Chemists will find their advantage in substituting it for Galls in the manufacture of Ink, in forming ointments for the cure of hæmorhoidal complaints, &c. &c. Taking the per centage of tannin as a standard of comparison, the intrinsic value of the American Sumach is equal to 1.443, or about 1½ of the best Aleppo Galls—hence the market value must always be estimated from the current price of that article.

Persons wishing to make trial of this new article, are requested to apply (post or carriage free), to Messrs. Vianna and Jones, Liverpool, to whom the cargo is consigned; to Mr. Samuel Rootsey, Chemist, &c. Bristol; to Messrs. Balkwill and Sons, Chemists, Old Town-Street, Plymouth; or to Dr. Hamilton, late Secretary to the Royal Devon and Cornwall Botanical and Horticultural Society, by whom every information required will be furnished, and with whom samples may be seen. As the quantity expected is but small, and the arrival of the cargo may be daily looked for, those who wish to become purchasers are requested to be early in their applications.

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[*] See page 338.

Plymouth, October 3d, 1834.

The *Cæsalpinia coriaria* varies in size according to the richness of the soil from a shrub to a large timber tree; the timber of which is valuable for many purposes of domestic economy and for building. It grows in the *hottest*, most sandy and arid soils, in which it appears to thrive better than in colder situations. In hot situations plants raised from the seed will flower in the third year of their growth, and will perfect their pods in the following year. In Carthagena, December and January are the flowering months, but the plants raised from seed which I sent to Jamaica in 1829, and which was sown sometime about the month of October, flowered for the first time in August, 1822,* and in the same month in the following year after flowering, the branches, which are slender, were bent down with the weight of pods. In Carthagena the pods are left on the trees till the high winds in March bring them down, when they must be gathered and housed before the April rains commence. From the experiments made on Oak bark however by Sir Humphry Davy, I should be inclined to think they would be found richer in the tanning principle if gathered by hand about the full moon of the month in which they attain their full growth, but before the sap has begun to descend, and the green colour to give place to the Mahogany hue of maturity. Oak bark is found to contain one quarter more tannin in spring than in autumn. The tannin resides wholly in the brittle exterior coat of the pod, all the rest being comparatively worthless; hence after dyeing, the pods should be ground in a mill and the refuse (amounting to one-fourth of the whole) separated by sifting. This refuse, though not worth the expense of freight, may be applicable to many useful purposes for dyeing, &c. on the place of production. In times of scarcity the pods are eagerly devoured by cattle. While young and soft, the pods are punctured by a small active little winged insect of a greenish colour, which deposits its eggs within, where they are hatched, and the young insects bury themselves in the seeds, the farinaceous portion of which they live upon as in the accompanying specimens of hollow seeds. This insect is, as Mr. Loudon, to whom I sent some for examination, informs me, a species of *Bruchus* similar to that which preys on the seeds of the family of *Brassicæ*, but has not hitherto been described by any Entomologist. I have named it for the present *Bruchus Cæsalpiniæ*, or the Dividivi Bruchus. I have frequently received it alive from Carthagena along with the seeds. A few specimens of dead Bruchi accompany this. How far the depredations of this insect are injurious to the pod itself must be determined by experiment.

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* Query, 1832.—Ed. Trans.

In forming plantations of the *Cæsalpiniæ coriaria* the trees should not be closer than 18 feet; whence an English acre will contain 135; and taking the average weight of produce from each when in full bearing, at 100 lbs. the harvest will amount to 135,000 lbs. the nett produce of which when ground and freed by sifting from the refuse, should be at least 101,250 lbs. or 45 tons 4 cwt. and 2 lbs. a return fully equal to that of the cane, and obtainable from land unfit for producing sugar.—*Transactions of the Agricultural and Horticultural Society of India.*—Vol. III. page 92—94. W. HAMILTON.

On the identity of the bark of the Strychnos Nux Vomica with the false Angustura of writers on Materia Medica.—By W. B. O'SHAUGHNESSY, M. D., *Professor of Chemistry, Medical College, Calcutta.*

Few medicinal barks have ever attracted more attention than that generally termed the false Angustura. Introduced into Europe originally as the bark of the *Galipea febrifuga*, its poisonous properties soon denoted a different source. The *Brucea ferruginea* and *antidysenterica* were next suspected, and this erroneous idea continued to be entertained so long, that on an alkaloid being discovered in the bark in 1822, it was named *Brucine*, in conformity with the supposed origin of the bark: In 1823, however, it was ascertained that the bark in question arrived in Europe exclusively from South America, and not from the shores of the Red Sea, where the *Brucea ferruginea* or *wooginoos*, is indigenous.

The question has continued at issue, from 1825 to the present period. In 1828 was published M. Fée's admirable work on the Natural History of Remedies; and this author, whose elaborate research is quite unsurpassed, describes the false angustura as "Arbor ignota, habitat in America meridionali." Dr. Duncan in the last edition Edinburgh Dispensatory, 1830, says, the tree from which the false angustura is obtained "is not yet known, but it is a native of South America, and therefore it is not, as formerly asserted, the bark of the *Brucea antidysenterica* which grows in Abyssinia."—p. 340.

In Dr. Thomson's last edition, 1833, p. 226, we find no further information than a brief allusion in a foot note to the existence of the spurious bark, and to Plamba's obsolete observations regarding its history and name.*

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* Nor in the later edition of 1836 is anything new added.—*Editor Madras Journal.*

The first hint we meet of the true nature of this bark occurs in the valuable Manual of Materia Medica, by Vavasseur and Edwards, in which, p. 269, the authors observe,—" This substance, obtained from South America, is probably yielded by a strychnos yet undescribed, and not by the Brucea anti-dysenterica," &c.

Lastly, in Dr. Christison's unrivalled work on poisons, last edition, October 1835, p. 806, we find the author observing—" It was long supposed to be the bark of the Brucea anti-dysenterica, but the latest inquiries seem rather to point at its being the produce of a species of strychnos, and perhaps of the familiar species, S. Nux Vomica.

Such is a fair outline of the history of this bark up to the latest period. Since the last meeting of the Society I have been enabled to clear up all doubts on the subject, and to identify the false angustura as the bark of the nux vomica tree.

The subject was brought to my notice by my having been intrusted with the analysis of a crystalline substance supposed to have been prepared from the bark of the Rohun tree *(Swietenia febrifuga)*. My experiments shewing that the crystals were brucine with traces of strychnine, the presumption immediately arose that the bark from which the crystals were obtained was the bark of the strychnos nux vomica, the only poisonous strychnos abundant in the Bengal jungles with which the natives are familiar.

Specimens of the bark from which the crystals were prepared, of the *kuchila* (native name of nux vomica bark) from the bazars, and from a strychnos nux vomica tree in the Botanical Garden, kindly supplied by Dr. Wallich, were readily procured and compared with each other—all were found identical in their physical and chemical composition, all yielded *brucine* and traces of *strychnine*, and all produced the same toxicological effects.

On a reference to the characters assigned by the authorities I have quoted as distinctive of the false angustura, we find the following chemical tests—1st, nitric acid, which changes the interior of the bark to a blood-red colour, and causes the red external exuberance to become green; 2dly, the prussiate of potash which causes in an infusion of the bark a faint green colour; and 3dly, sulphate of iron, which changes the infusion to a deep green. To all these re-agents the nux vomica bark presents the described indications.

The most remarkable and curious of the external characters of the nux vomica bark, and one in itself an indisputable proof of its being the false angustura, is the singular red exuberance which occurs on the outer surface of the specimens now presented to the Society.

This red exuberance was the first property of the spurious angustura bark which attracted attention in Europe. M. Fée states that it frequently happens that " the false angustura has a spongy exuberance of a very beautiful rust colour, and that M. Pelletier who had analysed it had by mistake described it as a lichen of the genus Chiodecton.

M. Fée denies that it is a lichen, and considers it as the result of a leprous disease of the bark, the stages in which he clearly and correctly describes. It commences, he states, by little regular prominences, surrounded by decayed epidermis. These tubercles increase in size, become irregular in outline and confluent, and pass through the several shades, between a clear yellow and iron-rust colour.

When the disease is of long standing, the part affected acquires considerable thickness, and is much deformed. No trace of organization can be detected in it by the naked eye. Examined by the microscope, it is found to be composed not of cellular tissue like Cryptogamic plants, but of true vascular tissue as in the Phanerogamic class,—a fact sufficient to shew that the exuberance is not a lichenoid production.

It is altogether unnecessary to add a minute description of the nux vomica bark, since Fée's account of it under the name of the false angustura, is as accurate as possible.

I trust the identification of the long doubtful false angustura may be of practical therapeutical utility, as well as pharmaceutical interest. It is extremely rich in brucea, an alkali of exactly the same properties as strychnea but fortunately but of one-twelfth the energy of that poison. According to the recent experiments of Andral, Magendie and and Chevalier, brucea is extremely effectual in the cure of paralysis, atrophy, chronic rheumatism, sciatica, and several analogous affections. I have much hope, too, that it will be found useful in the treatment of intermittent and remittent fevers. The bark will now become an article of some consequence as an export, since the preparation of brucea as a medicine was limited or almost prevented by the rare and casual supply of the bark, from which it was obtained. In fact, brucea was only to be found in the museums as a curiosity. In the shops its price was as high as 40 shillings the ounce—hence the virtues of the remedy were only ascertained, its benefits not diffusible. We can now prepare it in Bengal for three or four rupees the ounce, and I have no doubt its consum ption will become very extensive.—*Quarterly Journal of the Medical and Physical Society of Calcutta,*—No. 1, January 1837. *October* 22, 1836.

Catalogue of Plants collected at Bombay.—By John Graham, Esq. *(Concluded from page* 183, *No.* 14*).*

172. Datura *fastuosa.* Common.—173. Dracæna *ferrea.* In flower pots only.—174. Dimocarpus *litchi.* In gardens, though not common. It bears fruit here but not equal to that obtained from China.*—175.

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* The *Litchi* forms the favourite fruit in Chinese deserts. It resembles somewhat the fruit of the Maple (*Acer Campestre*) in external appearance. The tree grows in a wild state in French and Danes' Islands, Whampoa.—Edit. *Records.*

Dalbergia *arborea,* native name Carunj. A very pretty tree; leaves deciduous in the cold weather.—176. Dalbergia *Sissoo.* Black wood used extensively in making furniture.—177. Dalbergia *scandens.*—178. Dolichos *tuberosus.*—179. Dolichos *cultratus.* A species of Dolichos is much cultivated and eaten like French beans, the *tetragonolobus.*—180. Dolichos *pruriens.*—181. Dioscorea *sativa.* Common yam.—182. Dioscorea *bulbifera.*—183. Diospyros *Ebenum.*—184. Daemia *reticulata.* 185. Dillenia *speciosa.*—186. Diospyros *montana.*—187. Diospyros *hirsuta.*—188. Daphne *Bholua.*—189. Dendrobium? On the Ghants.—190. Dombeya *palmata.* In gardens only.—191. Exacum *bicolor.*—192. Evolvulus *hirsutus.**—193. Euphorbia *Tirucalli.* Common milk bush. —194. Euphorbia *antiquorum.*—195. Euphorbia *tithymaloides.* Used for edgings, instead of box.—196. Euphorbia *neriifolia.*—197. Euphorbia *hirta.* A common weed.—198. Eugenia *jambos.* Jambler, rose apple.—199. Eugenia *Malaccienxis.*—200. Erythrina *Indica.* A deciduous tree. It flowers in March and makes a very showy appearance.—201. Eupatorium *Zelonia.*—202. Eclypta *prostrata.*—203. Elephantopus *scaber.*—204. Feronia *elephantum.* Wood apple, a large handsome tree.—205. Ficus *Carica.* In gardens only.—206. Ficus *religiosa.* Pepul tree.—207. Ficus *Indica.* Banyan tree.—208. Ficus *elastica.*—209. Ficus *racemosa.*—210. Ficus *pubescens.*—211. Flacourtia *sapida.* In gardens only.—212. Flacourtia *sepiaria.* Elephanta.—213. Flacourtia *inermis.*—214. Guazuma *ulmifolia.*—215. Gardenia *radicans.* In gardens only, cultivated for its beautiful, white, sweet smelling flowers.—216. Gardenia *lucida.* Elephanta.—217. Gardenia *dumetorum.*—218. Gardenia *esculenta.*—219. Getonia *floribunda.*—220. Grewia *orientalis.*—221. Gomphrena *globosa.* In gardens only, cultivated for its flowers.†—222. Gloriosa *superba.* Common during the rains.—223. Guilandina *bonduccella.*—224. Gärtnera *racemosa.*—225. Garcinia *Cowa.* Common in the Concan.—226. Grewia *Asiatica.*—227. Gerardia *delphinifolia.*—228. Gmelina *arborea.*—229. Gmelina *Asiatica.*—230. Gossypium *herbaceum.*—231. Glycine *Sinensis.*—232. Galega *purpurea.*—233. Garuga *pinnata.*—234. Grislea *tomentosa.*—235. Hoya *carnosa.* Cultivated as an ornamental plant.—236. Hoya *viridiflora.*—237. Hyperanthera *Moringa.* Very common.—238. Helicteres *ixora.*—239. Hibiscus *populneus.* Bhendy tree.—240. Hibiscus *rosa Chinensis.* Cultivated as an ornamental plant.—241. Hibiscus *mutabilis.* Cultivated as an ornamental plant.—242. Hibiscus *Sabdariffa.* Iropille, used in making jellies, tarts, &c.—243. Hibiscus *esculentus.* Commonly cultivated.—244. Hibiscus *surratensis.*—245. Hibiscus *cannabinus.*—246. Hibiscus *tricuspis.*—247. Hedysarum *gyrans.* 248. Hedysarum *strobiliferum.*—249. Hedysarum *tuberosum.*—250. Hedysarum *vespertilionis.*—251. Hemidesmus *Indicus.*—252. Ixora *cocci-*

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* Is this not a variety of E. *alsinoides,* a common plant in China?—Edit. *Records.*

† Indigenous to China.—Edit. *Records.*

nea.—253. Ixora *parviflora.*—254. Ipomœa *Quamloquit.* Cupid's flower.[*]—255. Ipomœa *fragrantissima.*—256. Ipomœa *tuberosa.*—257. Impatiens *Balsamina.*[†]—258. Inula *Indica.*—259. Jasminum *Sambac.* Mogrel, native name. Extensively cultivated for its flowers.—260. Jasminum *odoratissimum.*—261. Jasminum *latifolium.*—262. Jasminum *undulatum.*—263. Jasminum *auriculatum.*—264. Justicia *picta.* Common in flower pots.—265. Justicia *nervosa.*—266. Justicia *bivalvis.*—267. Justicia *montana.*—268. Jonesia *pinnata.* On Salsette.—269. Jatropha *curcas.* Used for forming hedges.—270. Jatropha *manihot.* In gardens only, very rare.—271. Jatropha *multifida.* In gardens, as an ornamental plant.—272. Kydia *fraterna.*—273. Kyllingia *umbellata.* Grass.—274. Loranthus. Several species.—275. Lawsonia *inermis.* Used for forming hedges.—276. Laurus *cinnamomum.* In gardens only.—277. Laurus *Persea.* In gardens only.—278. Limonia *monophyllum.*—279. Limonia *trifoliata.*—280. Lagerstroemia *regina.* In the Concan.—281. Lagerstroemia *Indica.*—282. Lagerstroemia *parviflora.*—283. Lantana *purpurea.*—284. Lepidagathus *cristata.*—285. Menyanthes *cristata.*—286. Menyanthes *Indica.*—287. Mussaenda *frondosa.* On the Ghauts.[‡]—288. Morinda *Indica.*—289. Morinda *citrifolia.*[§]—290. Mirabilis *Jalapa.* In gardens.—291. Mangifera *Indica.*—292. Mimusops *elengi,* and 293. Mimusops *hexandra.* Both pretty trees commonly planted by Mussulmen around towns, such as Aurungabad, &c.—294. Murraya *exotica.* In gardens only.—295. Melia *azidiraltea.* Neem tree.—296. Myrtus *communis.* In gardens.—297. Maumea *America.* In gardens, rare.—298. Michilea *champaca.*—299. Momordica *charambee.* Commonly cultivated as an article of food.—300. Menispermum *cordifolium.*—301. Musa *paradisaica.* Plaintain.—302. Musa? On Ghauts.—303. Mimosa *pudica.*—304. Mimosa *cinerea.*—305. Mimosa *Arabica.* Babool tree; common; in extensive use as firewood.—306. Mimosa *scandens.* On the Ghauts.—307. Mimosa *Sirissa.*—308. Mimosa *glauca.*—309. Mimosa *dulcis.*—309. Moræ *chinensis.*—310. Mentha *perilloides.*—311. Marsilea 4-*folia.*—312. Morus *Indica.*—313. Milhavia *tomentosa.* In gardens only.—314. Mesembryanthemum? In gardens only.—315. Nyctanthes *Arbor tristis.*—316. Nicotiana *Tabacum.*—317. Nerium *Oleander.*

318. Nerium *coronarium.*
319. „ *coccineum.* Rare.
320. „ *antidysentericum.*
321. „ *tinctorium.*
} All cultivated as ornamental plants.

322. Nymphea *lotus.*—323. Nelumbium *speciosum.*—324. Nauclea *orientalis.*—325. Oryza *sativa.* Common rice.—326. Ocimum *sanctum.* Planted at temples.—327. Ochna *lucida.*—328 Piper *nigrum.* In

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[*] This plant is indigenous to Danes' Island, China.—EDIT. *Records.*

[†] This species occurs in China.—EDIT. *Records.*

[‡] Abundant on French Island, Whampoa, China.—EDIT. *Records.*

[§] A native of China.—EDIT. *Records.*

gardens.—329. Pladua *virgata.*—330. Plumbago *rosea.*—331. Plumbago *Zeylonica.*—332. Physalis *angulata.*—333. Plumeria *acuminata.*—334. Periploca *esculenta.* A very pretty twining plant; flowers during the rains.—335. Perilla *ocymoides.*—336. Polyanthus *tuberosa.* Cultivated in gardens; worn by native women in their hair.—337. Parkinsonia *aculeata.* In gardens.—338. Poinciana *pulcherrima.* Common in gardens. It grows in abundance close to the caves of Ellora, near Aurungabad, but I suppose it has all been planted.—339. Portulaca *oleracea.*—340. Psidium *pyriferum.* Grown in gardens.—341. Punica *Granatum.* Grown in gardens.—342. Premna *integrifolia.*—343. Phlomis *Indica.*—344. Pedalium *Murex.*

345. Passiflora *fœtida.* In Gardens.
346. „ *laurifolia.* Do.
347. „ *minima.* Do.
348. „ *alata-cœrulea.* Do.

349. Pistia *Stratiotes.*—350. Pentapetes *phoenicea.* In gardens.—351 Pterospermum *acerifolium.*—352. Phaseolus *Mungo.*—353.—Polygonum *glabrum.*—354. Phyllanthus *bacciformis.*—355. Pandanus *odoratissimus.*—356. Prenanthes *sarmentosus.*—357. Quisqualis *Indica.* In gardens.—358. Rhizophora *Mangle.*—359. Rosa? Several species in gardens.—360. Ricinus *communis.*—361. Ruellia *Zeylonica.*—362. Rottleria *tinctoria.*—363. Saccharum *officinarum.* Cultivated.—364. Smilax *aspera.*—365. Santalum *album.*—366. Solanum *tuberosum.*—367. Solanum *lycopersicum.*—368. Solanum *melongina.*—369. Solanum *nigrum.*—370. Solanum *jacquini.*—371. Sterculia *colorata.*—372. Sterculia *urens.*—373. Sterculia *foetida.* Poon tree. Grows to a great height in Malabar; masts are made of it.—374. Sphæranthus *Indicus.*—375. Sansevoera *Zeylonica.*—376. Sapindus *emarginatus.*—Sapindus *tetraphyllus.*—377. Spondias *Amra.*—378. Sesamum *Indicum.*—379. Sida *populifolia.*—380. Smithia sensitiva.—381. Spilanthes *alba.*—382. Salvadora *persica.*—383. Stemodia *ruderalis.*—384. Tectona *grandis.* Teak tree.—385. Tamarix *Indica.*—386. Turnera *ulmifolia.* In gardens.—387. Tradescantia *discolor.* In gardens.—388. Tradescantia *cristata.*—389. Triumfetta *annua.*—390. Thunbergia *grandiflora.* In gardens.—391. Tamarindus *Indica.*—392. Tagites *patula.* In gardens; worn by native women in their hair,—393. Trichosanthes *Anguina.*—394. Trophis *aspera.*—395. Terminalia *Catappa.*—396. Terminalia *alata.*—397. Terminalia *Bellirica.*—398. Tabernaemontana *dichotoma.*—399. Utricularia *stellaris.*—400. Ulmus *integrifolia.* Salsette.—401. Unona *longifolia.*—402. Vitis *vinifera.* In gardens.—403. Vitex *trifolia.*—404. Vernonia *arborea.*—405. Vernonia *anthelmintica.*—406. Verbena *sativa.*—407. Verbena *dichotoma.*—408. Viscum *compressum.*—409. Vangueria *spinosa.*—410. Vangueria *edulis.*—411. Vitmannia *elliptica.*—412. Yucca *gloriosa.*—413. Zingiber *officinale.*—414. Ziziphus *Jujuba.*—415. Zinnia *elegans.* In gardens only. 416. Zea *Mays.* Indian corn; extensively cultivated.—417. Zapania *nodiflora.*—*Records of General Science,* Nos. 21 and 22, *for September and October* 1836.

Account of the Province of Rámnád, Southern Peninsula of India. Compiled from the "Mackenzie Collection," and edited by the Secretary to the Royal Asiatic Society.

INTRODUCTION.

This province, the government of which is now administered by the British, formed in ancient times the greater part of the principality, or fiefship, of the *Sétu-pattis*, the chiefs or guardians of the passage leading from the continent of India to the island of Rámésware, and thence to the opposite coast of Ceylon, called Ráma's Bridge, or Adam's Bridge. These chieftains, dating their authority from the period of the establishment of a place of pilgrimage on the island of Rámésware, by the Great Ráma, claim an antiquity even higher than that of the Pándyans, or kings of Madura, but to whom, it would appear, that they were, in general, tributary, though now and then asserting and maintaining their independence. Of their history, however, we are not now to speak, but of the province as it was in the year 1814, when the data were taken from which chiefly the following account is compiled. It lies between the ninth and tenth degrees of north latitude, and the seventy-eighth and seventy-ninth of east longitude; is bounded on the north by the provinces of Tanjore and Pudukotta, on the south and east by the sea, and on the west by the districts of Tinnevelly, Madura, and Sivaganga; and comprehends an area of nearly two thousand five hundred square miles. Its general aspect is that of high and low lands, the latter having numerous artificial lakes, constructed for the purpose of promoting cultivation; the former exhibiting a variety of dry grain-fields, while the northern districts abound with extensive groves of Palmyra trees, with scarcely a vestige of jungle. The whole is divided into seventeen districts, comprising one thousand six hundred and sixty-eight towns and principal and subordinate villages, with a population, at the period to which we allude, of about one hundred and fifty-seven thousand.

FORTS, TOWNS, AND VILLAGES.

Rámnád,[*] the capital of the province, has both a fort and a town. The former is a fortification, the sides of which, from north to south, and from east to west, are each about half-a-mile in length, consisting of a single wall, strengthened with thirty-two bastions, built at equal distances from one another, and with one gate-way which is to the east. The wall is twenty-seven feet high and five feet thick, without a rampart, but with loop-holes, and surrounded by a ditch. This fort was built upwards of two hundred years ago, by MOGHAVA RAGUNATHA SETUPATTI, who, at the same time, constructed the large reservoir, or artificial lake, that lies on the N. W. side. About two hundred yards from the gate stands the chieftain's palace, which is a spacious Gothic structure, surrounded by a high wall, within whose cincture is seen a great number of apartments, some of two and others of three stories high, whose fronts and portals exhibit some taste, according to the Carnatic style of architecture. In the grand hall, called Rámalinga Velasam, the chieftain, his wives, and his ancestors, are represented in a highly embellished manner; and, among a variety of other paintings and gildings, finely varnished, is a painting of the battle between the rájás of Tanjore and Rámnád, which happened in the year 1770. In the outer court, at the grand entrance, is the chieftain's kachahri;* on the south side, in the outer court, are large stables for elephants; and, on the north side, stables for horses. On the north-east bank of the reservoir is a small and beautiful Protestant church, with a burial-ground adjoining it, as also a vestry-house. A few yards from the western bank of the reservoir is the burning-place of the chieftain and his ancestors, where several grand tombs are erected to the memory of the latter. On the north side, between the walls of the fort and the reservoir, is a high cavalier, raised with earth, which commands an extensive and delightful prospect of the surrounding plains. A Roman Catholic chapel, which was built by Colonel MARTINEZ, in the year 1799, stands near the south-east angle of the fort, and nearly in the centre stands a small Hindú temple. The principal streets, which are few, are wide and airy; the others, which are numerous, are irregular and narrow. The houses are mostly thatched roofs.

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[*] Properly, Rámanátha-púram, from Ráma, the god, or king of that name; nátha, a lord, and púram, a town or city.

The town of Rámnád is situated east of the fortress, from the gate of which a wide street leads, with two grand rows of bazars, regularly built. Here a market is held every Wednesday, when the people, from a distance of fifteen or twenty miles, bring in cotton, grain, and other provisions for sale. The town, and its suburbs, including Letchmapúram (a village situated to the north), are about three miles in circumference. At the east end of the bazars, where a road intersects, crossing north and south, are several detached houses, with gardens surrounding them, and a small mosque. These separate one part of the town from the other. There are, also, two or three other mosques, which, though not conspicuous, are by no means inelegant. Upon the whole, the streets are narrow and ill-contrived; the houses are moderately well built, and are upwards of two thousand three hundred in number; and the population exceeds eight thousand seven hundred souls, consisting of Musalmáns, Bráhmans, and Sudras, and a few native Christians; many of the two former carry on a considerable trade in grain and other articles of import from Travancore, Ceylon, &c. There are no artisans here, excepting gold and silversmiths, braziers, and ironsmiths; the latter, about two hundred families, who are Musalmáns, reside in the town. The east part of the town is inhabited by manufacturers of chintzes and printed cloths.

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* A hall of justice, an office.

Letchmapúram is seated east of the large reservoir of that name. It has a handsome Hindú temple, built about thirty-six years ago; and on the north-east of the reservoir stands a spacious and elegant chattiram,* or caravansery.

Kámúri, a fort lying thirty-one miles west of Rámnád, and thirty miles south by west of Sivaganga, is seated on an elevated rocky ground on the north bank of the Kúndár river, and commands a most delightful and extensive prospect. It is small, but of some strength, built of stone, of a circular form, with a double enclosure of walls, having an interval between them of about sixty feet; the outer wall is twenty feet high, and about four feet thick, without a rampart or parapet, but has nine bastions: the inner wall is stronger, twenty-five feet high, with a rampart, and seven bastions. On an eminence, to the south-west, is a redoubt. In the inner fort, a granary and magazine still remain; between the two walls, on the western side, is a well of very clear water cut through rocky strata, having steps on the one side descending to the bottom. This work appears to have been performed with great skill, though, no doubt, not without much difficulty, owing to the solidity of the rock.

About one thousand yards from the fort, on the southern bank of the river, the town of Kámúri is seated. A small Hindú temple stands on the north side, and a pretty wide street surrounds it. There are many more streets, but most of them narrow and crooked, with low thatched houses built of earth; a few, however, are covered with tiles. Almost in the centre stands a grand terraced house, belonging to a native, the elegance and situation of which afford an agreeable prospect. In the dry season the dust and heat are almost intolerable; and in the rainy season, owing to the black soil, the mire is so deep as to render the streets almost impassable. Some of the inhabitants here are very opulent men, and many of them trade to a considerable extent in cotton, as it is in greater plenty here, and in the neighbourhood, than in any other part of the province. A great market is held on every Tuesday, when astonishing crowds of people come from the neighbouring districts for the purchase of articles to retail in the different villages. Cattle are also brought to this market for sale.

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* These chattirams much resemble the ancient hostelries of Europe. They are charitable foundations for the lodging and entertainment of a certain number of guests for a specified time; one day, three days, and sometimes longer. Some are founded merely for the relief of Bráhmans; others, for all classes of the natives; and some, for the accommodation and entertainment of Europeans. The late Rájá of Tanjore had one at which, for the space of three days, any European gentleman passing that way was most sumptuously entertained. Similar ones were also to be met with in other parts of the Carnatic but a very few years ago.—Ed. *Jour. R. A. S.*

Armukamkotta is a fort that lies twenty-one miles north by east of Rámnád, on the road towards Trichinopoly, and three miles east of the lake of Rasingamangalam. It stands upon an eminence, having a gentle declivity to a river which runs by it to the north and to the east. This river has an impetuous torrent, and in the rainy season flows up to the walls of the fortress, and, inundating a large tract of land in its course down towards the sea, often proves injurious to the villages situated on it. The fort is denominated after its form of a hexagon, having six bastions at equal distances. It was built about one hundred and ten years ago, and appears, from the accounts respecting it, to have been a place of some importance. It is in good order, has a gate on the west, and a few wells of excellent water, which are now appropriated for the use of the garden that is made in it by the neighbouring villages : it is otherwise desolate and uninhabited.

At Mangalagúdi is a small ruined fort. This village is situated on the high road from Armukamkotta, and is chiefly inhabited by Musalmáns, who carry on a little trade. A market is held here every Thursday.

There are several other forts, but all in a ruined state, and almost levelled to the ground.

Tirupallani, a populous village six miles south of the capital, situated on a commanding plain, is highly distinguished as one of the sacred places of Hindú worship ; the temple stands on the east side of the village, and a rectangular reservoir is situated opposite to it. Two pavilions are raised on stone pillars ; the one adjoining the gate of the temple, the other to the east of the reservoir. The temple is surrounded by a high stone wall. The main street of the village is about two furlongs in length, and forty feet wide ; the south and east streets are inhabited by Bráhmans, and the north and west streets by the people attached to the temple, and other Hindús. This temple is dedicated to the god Jaganátha, and the festivals are celebrated annually in the months of April and July. In the north-west and south-west angles of the village, are two substantial stone pavilions ; and, on the north-east side, a reservoir of excellent water. A broad but shallow salt-water lake runs west of the village, which receives the surplus waters that flow from the interior parts of the country, especially from the kalingula, or sluice of the Chakkrakotta lake, the whole falling eventually into the Kottagudi river.

The pilgrims who resort to the temple at Rámésvara to pay their adorations, must, after performing their ablutions in the sea, first come here to worship.

Adisétu-tírtha is not a village, but a famed place on the coast, lying nine miles south of the capital; it is esteemed holy by the Hindús on account of its *bath*, which was found by Rama, who bathed here, on his expedition to the Isle of Lanka. The men generally bring their wives and families with them; but, in the event of the wife not being present, the priest gives the husband a piece of straw to roll round the little finger of his right hand, as an emblem of the wife. The act of washing here in the sea is a form of penance that they perform, from a general notion that, by doing so, they wash away all their sins. Devotees, and especially those of the Bráhman caste, who go on pilgrimage to the Isle of Rámésvara, must return hither to perform the enjoined rites of devotion, and the priests who attend here make a small collection from them, giving in return holy ashes to rub on their foreheads. The neighbouring villagers assemble here to bathe on certain days of the year; also on the days of the new moon, and particularly at the time of an eclipse either of the sun or moon..

Kílakarai, a populous sea-port and commercial town, situated nine miles south by west of the capital. It is inhabited by Muhammadans, many of whom are opulent, and carry on a considerable trade both by sea and land. The houses and granaries are finely built on the margin of the sea, from which it has a beautiful appearance. The circumference of the town is about two and a half miles; the streets are numerous, but narrow and ill-formed; the houses are low and have thatched roofs. A small Roman Catholic church is situated near the eastern skirts of the town, contiguous to which are the ruins of a Dutch factory. There are about eleven mosques, or rather tombs of some respectable Musalmáns who have died here, a few of which are very elegant in structure, especially one which stands about the centre of them, the cupola of which is covered with gold. The place abounds with very thick groves of Palmyra trees. It carries on a good sale in Padanír,[*] which the Musalmáns much esteem, and drink to excess. The inhabitants of this town follow almost every trade, and carry on an extensive manufacture of long cloths, both fine and coarse: upwards of a hundred boats belong to this port. The coast abounds with low rugged rocks, which are only seen above water at low tide; it is, therefore, dangerous for the passage of vessels, unless conducted by a pilot who is well experienced in these roads. Vessels pay for their anchorage here as well as in other parts. A sea custom-house is established here.

[*] A sweet beverage extracted from the Palmyra tree, similar to toddy, but with which is mixed a little chunam: when boiled, it becomes jaggry, a coarse kind of sugar.

Muttupetta, a fishing village on the coast, situated nine and a half miles south-east of Rámnád, is chiefly inhabited by Roman Catholics. There is a large Roman Catholic church in the centre of the village, dedicated to the Virgin Mary, and a priest resides here, who is a native of Goa. A few merchants belonging to this place reside at Periapatam, a village situate about one mile to the west. Eleven fishing boats belong to this port, which carry on a pretty good trade both in fresh and salted fish: the Muhammadan inhabitants here are chank fishers. The place is the occasional resort of European gentlemen, who come for the benefit of their health, and to enjoy the sea-breeze.

Vaidálai, a pretty populous village on the coast, situated thirteen miles east of Muttupetta, inhabited chiefly by Musalmáns and Shánárs,* the former carrying on a good trade. The houses are poorly built and very irregular. This is a noted place for a superior quality of the Choya-vér, which is the root of a certain plant from which is extracted a red dye. It grows spontaneously in these parts, and on an island opposite to this place. Considerable revenue is derived from it.

Autankarai, a sea-port, situated eleven miles east of the capital, at the mouth of the Vigay river, on the north bank, inhabited by fishermen; it has a spacious and well-built chattiram, surrounded by a strong wall. There are sixteen boats daily employed in fishing, and from this place, and the neighbouring villages on the coast, the town of Rámnád is well supplied with fish. Several vessels frequent this harbour at the proper seasons of the year to receive paddy and chanks for exportation, as well as the Choya-vér, which here also grows spontaneously to a great extent. Oysters are to be had in abundance, and are of good flavour. About two miles on the north-west lies Ullagenkolam. This place is distinguished for the excellent tobacco it produces, which thrives here extremely well, and is reckoned superior to any in the provinces south of Madras.

Dévipatnam—a sea-port and populous commercial town, well known by the name of the Nine Stones—is celebrated for a bath in the sea, that has been held sacred from the most remote antiquity, and is visited every year by a great number of pilgrims. In ancient days, from this place to Darpasenam, commonly called Tirupallani, was one continued forest, called Purárányam. Rama resorted here when on his expedition to Lanka, with a design to kill Ravanan, who had seduced away his wife. The priest of Rama told him that, in order to be successful in his undertaking, he must worship some image resembling the nine planets, including the sun and moon, in representation of which he planted the nine stones on the sea-shore, and, having dedicated them to the nine planets, worshipped them accordingly with much fervency; since which period the Hindús have a tradition, that by bathing here they will be cleansed from their sins, and that, by visiting so miraculous a place, they will, in like manner, be successful in all their enterprises: it is, moreover, observed, that these stones are an emblem of prosperity to the country, and, in the event of any of them breaking off at the top, it is considered a prognostic of some disaster.

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* A caste of Hindús whose particular avocation is the cultivation of the palm and the collecting of the toddy it produces. Many of them, however, apply themselves to other occupations, and some are very opulent.—Ed. *Jour. R. A. S.*

A considerable trade is carried on here; there are about fifty trading boats belonging to the port, which, as well as that of Kilakarai, is plentifully stored with provisions, and is, therefore, considered a place of much importance. In times of scarcity the granaries are thrown open, and a free sale is carried on, conducing greatly to the general benefit of the inhabitants, and to the opulence of the merchants who reside here. About the centre of the town stands a Hindú temple, encompassed by a wall and a wide street, through which the wooden chariot of the idol is drawn at the festival, which is held in the month of March. A large pavilion is built on the west of the temple, on the high road, for the convenience of travellers, where, also, alms are bestowed daily on a small number of Brahman passengers, who, however, are not allowed to stop longer than one day. This place being a quay for paddy-boats, and other small craft, a sea custom-house is here established.

Rásingamangalam is a large village situated eighteen miles north of Rámnád, and about one mile east of the large lake of that name, which irrigates an extensive sheet of paddy lands. It is populous, has a few wide streets, and the houses are built moderately well. In the north-east part of the village stands a small Hindú temple, where an annual festival is celebrated in the month of June. To the south-west is a remarkably thick grove of mangoe-trees, affording a pleasant and delightful shade. A small village called Auveranyaindel, lies three miles to the north-east, where a weekly market is held on Thursdays.

Tirupalágudi, lying five miles north of Dévipatnam, is seated below the bank of a lake, and west of the road towards Tanjore. It has a lofty temple almost in the centre of the village, but it is inhabited principally by Musalmáns, who are engaged in the manufacture of long cloths. There is a pavilion on the high road, fronting a reservoir of excellent water, and commanding an agreeable prospect of the sea.

Arnútmangalam is situated two and a half miles to the north of Armukamkotta, on the road towards Trichinopoly; it is inhabited by a peculiar tribe of Velálars* called Arambukutan Velálars; according to tradition, they are a modern people, who, emigrating from the southward,

* A caste of Hindús, whose principal occupation is husbandry.

settled here as farmers about four hundred years ago: their manners and customs, distinguishing them from the other classes of Velálars, are very singular. The men marry among their own tribe, and never seek a bride elsewhere. They will on no account engage to hold a situation under any authority whatever, but employ themselves solely as cultivators of the land: they will not make obeisance to the rájá of the country, nor will they pay any kind of formal respect or compliment to any description of persons, but express their humility by rubbing their bellies with their right hand.

Tondé, a sea-port town situated on the road towards Tanjore, is a dependency of Sivaganga. It carries on a good trade with Columbo, and other sea-ports. A few opulent merchants reside here. The houses are low built; the streets narrow and irregular; the inhabitants are principally Musalmans, but there are also a few Karaiyars; the former are engaged in manufacturing long cloths, and the latter are fishermen. Inland commodities, consisting of grain, tamarinds, cloths, &c. &c. are exported from this place, as also chanks, which are fished in great abundance. It lies eleven miles north-east of Armukamkotta.

Tiruvádanari, a village of some note from having within it a grand Hindù temple, is situated on the high road which leads from Sivaganga to Tondé, and intersects the road that leads from Sivaganga to Trichinopoly; the temple stands near the west end of the village, encompassed by a high wall and a street: the houses are tolerably well built. An annual festival is celebrated here in the month of April; and a weekly market is held on every Monday. It lies seven miles and a half west-north-west of Tondé.

Kunnangudi, a pretty populous village, has a temple on the west, encompassed by a wall, in which is a well of excellent water. It lies five miles and a half on the north-east of Hanumántagudi. This temple is of great antiquity, and is said to have been built by Karikala Chola Raja, while on his religious excursion to Rámèswara. A grand festival is celebrated here annually in the month of June. The productions are chiefly cotton, paddy, and dry grain.

Kottapatnam is a small sea-port town, situated in the Tanjore country, ten miles north of the Pámbanár, which forms part of the general boundary between Tanjore and this country. Several small detached pieces of land appertaining to the latter are irregularly situated in the Tanjore country. A Bráhman village lies east of the road, and within the town are two mosques. Fine cloths, &c. are manufactured here by the Musalmáns, who carry on a pretty good trade. Chanks are fished in abundance, and a good deal of salted fish is carried from this port to distant markets.

Dévakotta is a populous village, but the streets are narrow, crooked, and dirty. However, it is a place of much importance for trade, and many Hindú merchants reside here.

Sálagrámam is a populous village, situated about a mile east of a large lake on the Sivaganga border, and inhabited by husbandmen, chiefly Velálars. It has two wide streets, and though the houses are neither large nor beautiful, yet, being situated on a high ground, and having an opening at the south and east sides presenting a variety of fields, for the most part of the year in a high state of cultivation, it is very pleasant. A manufacture of brown sugar is carried on here, and a plentiful market is held on every Tuesday. It lies nineteen miles north-north-west of the capital.

Séranám is a small village inhabited by Roman Catholics, seated below the bank of a lake near the borders of Sivaganga. It is noted for a beautiful Roman church, and is the residence of a priest, who has the superintendence of all the Christian villages in this part. It lies five and a half miles north of Sálagrámam.

Kamenkotta is a populous village situated twelve miles north-west of the capital, and south of the high road leading from Madura to Rámnád. Opposite this village is a beautiful pavilion seated on the south bank of a large and fine reservoir, which is filled from the river Vigay. This part of the province is richly cultivated in paddy, and has garden productions in great abundance.

Pagalúr is a small village seated below the bank of a large lake of that name, lying seven miles to the west of the capital. It is celebrated as being the place at which a ceremony is performed on the installation of the zemindár or chieftain of Rámnád. This ceremony is held to be most essential, as the inhabitants of this village are of the original stock from which the guardian of Adam's Bridge was first selected, and therefore they retain the prerogative of bestowing the title of Sétu-patti; the zemindárs, in consequence, observe to the present day to resort hither to receive the sceptre of authority, according to ancient usage; the ceremony continues for a few hours, and consists of a variety of pompous rites.

Gangakondán, a populous town seated on the eastern bank of the Vigay river, lies ten miles north-west of the capital. It is composed of several irregular streets, and has a very good market on every Sunday, is well stored with grain, cotton cloths, and all articles of provision. Extensive groves of Palmyra trees abound on the northern and eastern banks of the river, the toddy from which is taken to Rámnád for sale.

Ninarkovil is a large village near the confines of the Sivaganga country, seated on a pleasant plain well cultivated with dry grain. It lies about fifteen miles north-west of Rámnád, and is distinguished for the grand Hindú temple that stands in the centre of the village. Two annual festivals are celebrated here in April and July. The place is held in high veneration by the Hindus. There is a large reservoir on the west side of the temple; south of which are several pavilions built for the zemíndár's accommodation, surrounded by a wall. Here is a small manufacture of coarse cloths, which are taken to the neighbouring markets and sold.

Parmagudi, a large and populous town of commerce, is situated on the southern bank of the Vigay river. It lies twenty-one miles north-west of the capital, and through it runs the high road from Rámnád to Madura. It is chiefly inhabited by weavers, and contains upwards of one thousand one hundred houses, for the most part covered with tiles; the streets are numerous, but dirty, and very irregularly formed. Manufactures of the best clóths, silks, muslins, silk carpets of great value, vestures, turbans, women's silk, and coloured cloths, are carried on here, and these articles constitute the best part of its trade. There are several ranges of bazars, and an annual festival is celebrated by a contribution raised by the weavers and merchants. A large and spacious stone pavilion, substantially built, is seated near the west end of the town, adjoining which is a chattiram, where alms are daily distributed among twelve poor Bráhmans, or other travellers. Yams thrive here, and are in great abundance. The ironsmiths here are Musulmáns, who are seldom known to follow this trade in other places.

Paindoni is a small village situated about two miles to the south-east, commanding an extensive view of fields of paddy, cotton, and dry grain.

Abramam, a populous and flourishing town on the high road to Madura, seated below the bank of a very large lake, which is named from it, lies five miles north-east of Kámúri, and thirteen miles south-west of Parmagudi. It is inhabited by merchants and tradesmen, who are principally Musalmáns and Chetties.* The farmers are Marravars† and Velálars, who carry on an extensive cultivation of paddy, which, from the ample supply of water that the lake affords, yields two crops annually. The town is about half a mile in length, divided by two well-formed but narrow streets. On the north side is a well faced with stones, which has a clear spring of excellent water, affording an abundant supply throughout the year, although there are many other wells about it, the waters of which are brackish. The trade is considerable in grain, cotton, and cloths. It is the popular belief, that within an area of two miles in circumference of the town, the bite of a snake, or of any other venomous reptile, has not the usual poisonous effect; and that when bitten beyond the prescribed limits, the patient is taken to a small temple that stands on the eastern extreme of the town, where some water is simply administered to him, when, as the people affirm, he perfectly recovers within a few hours.

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* A cast of Hindús whose principal occupation is merchandise.

† A cast of Hindús who appear to be almost confined to this part of the country. Their occupation is husbandry. In customs they differ from the Velálars, and most other castes of Hindús, and allow their widows to marry a second, third, or fourth time.—Ed.

Viracholen, a village lying about seven miles north-west of Abramam, is seated on the south bank of the Kredamánadi river. It was anciently the residence of the rájás of the country, in whose days it is said to have been very populous, and it still abounds with remains of antiquity which corroborate the assertions of the people of its having been once a place of grandeur and magnificence, and the residence of the Chola Rájá, from whom it derives its appellation. The present population is very inconsiderable, and consists of Musalmáns, Kallaris,[*] Marravars, and a few other descriptions of people. The manufacture is long cloths: on the north side of the village stands a small Hindú temple of great antiquity. There are the ruins of many other edifices in this vicinity.

Shekull, a populous village situated on the high road towards Tinnevelly. It lies below the bank of a large lake of the same name, and is inhabited by Velálars, Marravars, and herdsmen: the road leads through the village; the houses are poorly built.

Kadaládi, a village situated on the road that leads from Kámúri to the sea-coast. It was a place of great note and commerce; and, though it at present shews marks of decay, it preserves some trade, and has a good market on every Tuesday. It lies ten miles nearly west of Shekull.

Tiruchuli, situated about three quarters of a mile south-west of the capital, and seven miles west by north of Abramam, is a large and populous town on the south bank of the Kundár river. Its inhabitants are numerous. It is composed of a few fine and regular streets, with pretty, well-built houses. The north and east suburbs of this village are diversified with small gardens of esculent and other plants.

Arpukotai, lying seven miles west-south-west of Tiruchuli, is a large village inhabited principally by weavers, who are employed in the manufacture of the company's long cloths. The western environs of this village are plentifully cultivated with tobacco—the soil, a black loam, being very favourable for the growth of this valuable production. A weekly market is held on Fridays, which is the chief one in this district.

Pundlagudi, eight miles to the south of Arpukotai, though not a village of great note, is, however, particularised as being the only place where the manufacture of saltpetre is carried on in this district; and also for a layer of white stone, of a brittle nature, which extends from the south of it in a north-westerly direction, as far as Palavanattam. The stones are collected, and burned in kilns for the preparation of chunam or lime, which is esteemed the finest sort that can be had in the province. The ruins of a double-walled mud-fort stand on the west of the village.

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[*] A low cast of Hindús peculiar to this part of India. They are herdsmen and cultivators, and, as their name implies, thieves by profession.—Ed. *Jour. R. A. S.*

RIVERS.

There are many streams in this province that empty themselves into the sea, but none are navigable, and few deserve the name of rivers. They are for the greatest part nothing more than broad brooks or rivulets; some are only drains flowing from the lakes, others spring from the high lands, and both are every where fordable. Running upon a flat and almost level surface, they become broad without having a bed of any depth. These rivulets, in their course, supply several lakes, and the water is reserved for the purpose of cultivation, which, in good years, yields a valuable produce.

Pámban-ár, a rivulet which rises from the high lands east of Kunagudi, in the Sivaganga, enters this province on the west, near the upper frontier, below the village of Perambúr, takes its course easterly about five furlongs, crosses the general boundary, and re-enters Sivaganga; where, for more than three miles, it continues its course, when, touching the boundary south-east of Tirtengúr, and winding along it for about three-fourths of a mile, it re-enters this province. About one mile in its tract it is intersected by a channel which supplies the Mutunád lake. Pursuing its course for a few furlongs in an easterly direction, it separates into two branches, which, after running nearly parallel with each other to the distance of three miles, unite near the junction of another channel, termed the Pámb-ár. Widening gradually in its course, the stream receives another branch below Elapagudi, which flows from the southern kalingula of the Mutunád lake, and proceeds south-east about three miles; touches at the boundary between the villages Payaddakotta and Mudukuvial; constitutes a small part of the northern boundary between this province and Tanjore, and continues its course for three miles, where it intersects a detached piece of land appertaining to Sivaganga; whence, meandering along the general boundary in an east-north-east direction, it separates into five branches, and disembogues into the sea by three mouths.

Vírashelai-ár, a narrow and rapid stream, has its source in the high lands in the vicinity of Prámalli, in the Sivaganga country; and, being fed by numerous jungle streams, passes by Naikupai, supplies the large lake at Tripatú, and, after an easterly course, crosses the high road that leads from Pudukotta to Sivaganga; thence, continuing easterly about a mile, it glides south, and crosses the road from Kunagudi to Tripatú, where it unites with a channel that flows from the northern kalingula of the Tripatú lake, continues its course to Murthen-puliar-kovil, through an entire wood, and traversing in an east-south-east direction four miles, receives a channel from the west, termed the Tirumunimutu-ár, about one mile south of Nedavakotta, whence it pursues an easterly course through a thick grove of Palmyra trees, widens in its way, and passes by Kullel Yalavenkotta, where it enters this province below the termination of a disputed boundary, and is joined by a channel called Koatha-ár, west of the village Othayauchi. It then takes a north-easterly course towards Thavakotta, where it separates into two branches, which, uniting about a mile to the east, run north of the fort of Hanumántagudi, and south of the village: it again separates into two branches. The northern one runs easterly three miles, and then separates into two streams, taking an east by south course for ten miles, and falls into the Pàmban-ár, below the village Audavatúr; the lower branch assumes the name Paushi-ár, from the village Paushipatnam, which is situated on the coast near the junction of this channel with the sea. The southern branch of the Virashelai-ár pursues a south-easterly course about seventeen miles from Hanumántagudi; passing by Kumbukotta and Audavatúr, it waters several tanks in its tract; and, crossing a high road that leads to Rámnád, along the sea-coast, discharges itself into the sea.

Munnímutu-ár, a rivulet issuing from the southern kalingula of Kotaivial lake, in the Sivaganga country, takes a south-easterly course, and, passing by Kaurai, Pauvanakotta, and Munní, enters this province on the east by the latter village, and afterwards pursues a south-easterly course eight miles; waters the several lakes in its tract; and falls into the Teruvádanári lake, from whence the surplus water, flowing over the southern kalingula of that lake, in like manner loses itself in other lakes towards the east, the superfluous waters of which still form a pretty wide stream near Thullamurrungur, and running in an open plain, crossing the high road to Rámnád, forms a communication with the sea to the south of Tondé.

Kotaikarrai-ár, a wide and rapid stream formed at the junction of two rivulets that enter this province on the west by the village Kokaárné, waters the large Rásingamangalam lake, the superfluous waters of which are conveyed by a channel that issues from a large and well-built kalingula constructed on the northern bank. This channel runs in an east-south-easterly course five miles, crosses a high road by Armukamkotta, and glides south-east nearly two miles; thence it pursues an east-south-east course towards Kunnaryaindel, runs south-east from that village about a mile, separates into two branches on the west of the high road, and communicates with the sea by two mouths about a mile distant from each other.

Vigay, a river which rises among the mountains on the south-east of the Dindigal valley. This river runs through the north-east ridge of a chain of mountains that border on the west of the province of Madura. It finally escapes from the mountainous tract which it traverses for about thirty miles, precipitates itself at the foot of the hill of Guntapanaikandr, passes by Pilmankúnbi, Nuddavakotta, and Cholavándán, and, being augmented by the waters of other small rivulets, it passes by Thovaramán and Madura; and thence rolling in a considerable body, and traversing these districts in a course nearly south-east, reaches Tripavanam, where it becomes very broad, continues in a winding course, and, being fed by other streams, passes by Mánamadura; then turning south a few miles it proceeds east, and enters this province on the west by the village of Tholachatanúr. Here for about eight miles it forms a part of the general boundary between this province and Sivaganga, in a course nearly due east. This fine river comes with a full swelling stream between Pirmaguda and Yaveneswara, towards Warapuli (where the boundary embraces a small village that stands on the south bank appertaining to Sivaganga); and gliding on south-east three miles, turns east for four miles, when the stream, flowing directly south for three and a half miles, is considerably diminished in its width, and now makes but a poor appearance in consequence of the numerous cuts from it for the purpose of irrigation, and to supply the lakes. The Vigay, now confined in a narrow bed, continues eastward in a winding course for eight miles, and then spreads into a large lake called Periyakolam. A small channel on the north continues easterly; it was recently cut to prevent the injurous consequences of inundations, which are represented to have frequently happened previous to this undertaking. The Vigay, retaining its name, proceeds eastward for six miles, losing itself in a salt-marsh which extends nearly five miles in length, and about a mile and a half in breadth, where, from the saline nature of the soil, a considerable quantity of salt is extracted. At the east end of the marsh the river again reappears, and proceeds in a south easterly direction about five miles; thence it forms a serpentine course, and communicates with the sea below the village Autankarai. The whole of its winding course is about one hundred and forty miles. The Vigay is the largest of all the rivers in the province, and is represented as possessing the rare advantage of affording water the whole of the year. It generally overflows from about October to December, after which it begins to decrease: the fertility of the provinces of Madura, Sivaganga, and Rámnád, depends upon the overflowing of the Vigay, from which numerous canals and water courses are led off to supply the several lakes, and for the purposes of irrigation. It is very precarious when the freshes descend in the month of April; the supply is then most carefully reserved for the purposes of cultivation. The lands upon the whole course of the Vigay yield an abundant and valuable produce.

Kredamanadi, a rivulet which has its source from the Vigay, near Madura, enters the Sivaganga country by Pilliyúr, in the Trippavanam district, winds in a south-easterly direction for about twenty-five miles, watering a great part of that country to the south-west, touches the boundary of Rámnád below the village Víragudi, and continues in a south-easterly course for three miles, passing by Víracholan; it further embraces a portion of the country to the north about a mile and a quarter, and thence forms another part of the boundary for about a mile, whence it glides on in a southerly direction, watering the country in its course for about eleven miles, and receives a small rivulet termed the Purralla-ár, near its confluence with the Ragunát'ha-kaveri.

The Trimangalum river, termed the Kund-ár. is a narrow and rapid stream which, rising among the hills of Annayúr, in the Madura district, enters this province on the north in the Pullimat'ham district, by the village Kurriapatti. It takes a winding course to the east about a mile, and thence turns almost south five miles, and passes by Toapúr and Parenjalli, where it receives the Sheverikotta river, which descends from the mountains in the Tinnevelly country; it widens greatly at the confluence, pursues a south-easterly course, runs between Tiruchuli and Pullimat'ham, washing the western wall of the fort, and continues to proceed to Elipúr, on the north of which it is intersected by a brook from the high lands to the east of Puliarnátham: from Elipúr, it winds eastwardly for six miles, and passes by Mandelmánikam, and, gliding on south-easterly two miles and a half, turns due south down to Kámúri, west of a high rocky ground, and runs between the fort and town. To the east of the latter, on the southern bank of the river, is a large kalingula, about one hundred and seventy feet in length, and about seventy feet in breadth; the time of its original construction appears to be unknown; but that it is of a very ancient date is sufficiently indicated by the style and state of the structure, which not only bears every mark of antiquity, but also of frequent dilapidation and repair. It is wholly composed of large weighty masses of rude stones laid upon one another without any regular system, every dependence having been placed upon the magnitude of the materials; hence the power of the great body of water, in its pitch over the work, has frequently occasioned breaches and also placed the structure in so critical a predicament, that the inhabitants of the country to the eastward, especially in the Shekull and Mutukullutur districts, sustain the loss of an extensive cultivation, estimated to be about sixty thousand pagodas annually. No anxiety appears to be entertained by the possessors of this province to adopt any measure for restoring so important a work to its primitive state. A large canal, led off from immediately above the work, termed the

Ragunát'ha-kaveri, flows upwards of twenty-four miles through the country to the eastward, being preserved in its course over a fine plane, and affords the means of cultivating the lands upon the whole of its tract, sluices having been constructed for this purpose, most of which, unfortunately, are now in ruins. This channel wastes itself ultimately in the Kullari lake, and the superabundant flow of salt-water issuing from the southern kalingula of this lake, falls into the salt-marsh below the village Vigay, and, cutting through it, assumes the name of Kottegudi-ár, which communicates with the sea, on the west of the spot called Adisétu-tírtha. The Kund-ár, or the surplus water that descends from the kalingula on the east of the town of Kámúri, winds in a south-easterly course for twenty-two miles, runs towards Mukúr, supplying in its tract a few lakes, and disembogues into the sea. It has a wide but shallow entrance, and a heavy shoal renders the free access of boats at the mouth impracticable.

LAKES OR RESERVOIRS.

These are variously named; the larger are called Yéris and Kummis, the lesser ones Yendels. The country abounds with them; several of the large ones are supplied by canals from the rivers, while others of less magnitude are filled by the local rains; the latter do not retain the water for more than three or four months. Although the larger lakes have a source whence they receive a constant and ample supply, yet the advantage of retaining their waters throughout the year is lost, from neglect of the regular system of inspection and repair. The periodical rains usually set in about the months of October and November, and the country then exhibits an almost entire watery surface; the great body of water confined by the embankments of the lakes spreads out to a great extent, often overflowing and destroying the embankments, greatly to the prejudice of the after cultivation of the lands, which depends upon the strength and preservation of these banks. When a general drought prevails, the inhabitants dig small pits in the beds of the reservoirs, whence they obtain a scanty and muddy draught. At this season the people are generally assailed by a disease called Guinea-worm; but they are so much inured to this tumour in their legs, that they think little of it. Of the principal Yéris, the following seem more particularly to deserve description, viz.:

Rásingamangalam, a large lake situated between the smaller lakes Kokaurne and Koshavan; its length from the north bank to the southern opposite extremity being nine miles, varying in breadth from one to two miles. It receives on the north side the stream of a rivulet that flows from the high lands in Sivaganga, denominated the Kottakarai-ár, and, on the south-south-west, the waters of the Vigay river. This lake originally watered about five thousand seven hundred and sixty kánis of land.* It has two large kalingulas at either extremity; the northern consisting of seventeen arches, and the southern of fifteen; and, besides these, eighteen lesser sluices, built of stone and brick, most of which, as well as the larger kalingulas, are in a dilapidated state, in consequence of which it cannot at present supply water for more than two thousand five hundred kánis. There are six breaches along the bank of this lake, occasioned by the breaking through of the waters during the monsoons, and these not being attended to, it presents much danger to the villages and lands lying below it to the eastward.

Perriakolam; this lake, with which the Vigay river forms a communication, is situated about a mile north-west of Rámnád, and extends in length about seven miles; its breadth varies from three-fourths of a mile to nearly two miles, and, from its greater depth, it has the advantage of reserving its waters for a longer period than the Rásingamangalam. It irrigates an extent of land consisting of one thousand eight hundred and sixty kánis. This Yéri has two large kalingulas; one to the north, consisting of nine arches, the water from which flows to the eastward on a low level, and falls into an extensive salt-marsh. The kalingula to the south consists of seven arches, and the stream from it falls into the Chukrakotta lake, which lies to the south. There are twelve smaller sluices to this lake, three of which are in ruins.

Chukrakotta lake, situated on the south of Rámnád, has a large and substantial kalingula consisting of eleven arches; the surplus water discharged from it forms a canal which flows into a marsh about a mile to the southward. A kalingula on the north consists of five arches only. This lake has twelve other sluices, denominated after the original possessors of the land depending thereon; five of these sluices have been in a state of decay for the last fifty years, and the inhabitants in consequence sustain a very great loss, as they cannot irrigate more than a fourth of the land that was formerly under cultivation.

Kullari lake receives the Ragunát'ha-káveri; it is situated between the villages Tirukoshamangai and Kurkáti, and irrigates about one thousand five hundred kánis of land. This lake has two kalingulas, and twelve smaller sluices, all of which are in good order: the great quantity of water that flows from these kalingulas spreads over a salt-marsh to the eastward, and from thence, forming a channel, ultimately falls into the sea.

Abramam lake, situated to the north of the village of that name, resembles in form a spur; it is supplied by a channel from the Kredamanadi, and waters about one thousand kánis of land: the bank is very high and substantially built. It consists of very large stones placed upon one another, and seems once to have been much more regular than at present; it has puzzled antiquarians to account for the laying of these enormous stones, as their weight is so great that no means are now known by which they could have been placed there. An odd tradition prevails that this was performed by demons. The bank is so well strengthened that it has never had any breaches, nor is it likely ever to require any great repair.

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* About an acre.

Several large lakes sustain considerable loss owing to the weak and unsubstantial condition of their banks. The waters from the high lands, and the surplus from the lake of Shekull, form a pretty wide stream, which discharges itself into the sea at Válimukam Bay, which has a good harbour for sheltering the vessels trading along this coast during the period of the land-winds and monsoon. Contiguous to this bay, on the north, is a large lake of salt-water that extends about seven miles to the west, its greatest breadth being a mile and a quarter. Salt is gathered in large quantities here, besides that which is manufactured in the salt-pans; this article is a produce very advantageous to government. Wells and fountains are, for the most part, exceedingly rare in the interior of this country, and the water that issues from them is of a very brackish quality. The sea-coast towns, although situated on vast plains of deep and heavy sand, afford fine wells and springs of clear water. A narrow salt-water lake, called Turrava, extends from the Kottaigudi river, below Tirupallani, to the east eighteen miles, and varies from one quarter to half a mile in breadth, bordering the declivity of a range of sand-hills. This lake has a verdure on its margin, which affords good pasturage for the cattle of its vicinity. On the south side are several thick groves of Palmyra and cocoa-nut trees. At some seasons of the year a dam is thrown across this lake, confining the water to a particular part, and, by letting it off as required, admits of the remaining portion of the bed being cultivated with rice. Another salt-water lake, but of smaller extent, lies to the east of the former, and has a communication with a basin of salt-water contiguous to the sea, east of Pullimat'ham.

HILLS AND MOUNTAINS.

There is not a mountain, hill, or any conspicuous eminence in the whole of this province; yet it exhibits, in several parts of its surface, gentle swells and depressions which give it a pleasing diversity, especially in the tract about Kámúri. In the Pullimat'ham district there are a few low scattered rocks, but of very inconsiderable magnitude. The sea-coast on the south, from Tonitorai westward, abounds with low, rugged rocks, extending into the sea; and these, with a great number of shoals and hidden rocks, render it dangerous for coasting vessels.

WOODS AND JUNGLE.

This country is, for the most part, divested of wood and jungle. Such as does exist is principally composed of the Odunkád, a kind of low thorn-tree, of which there are various sorts; but none of them are of a size to yield good timber. Near the sea-coast towns are extensive groves of Palmyra and cocoa-nut trees. The northern districts abound with the former, the soil being admirably adapted for their growth. Mangoe, Illapay, and other fruit-trees, are scarce throughout the province, and cocoa-nut trees are rare in the interior of it.

TIRTHAS.

These are certain consecrated spots in the sea, considered as sacred places for bathing, to which the Hindús frequently resort on pilgrimage from all quarters of India, to perform their ablutions, especially at the nine stones at Válimukam and Adi Sétu-tírtha, which are renowned places of sanctity on this coast. The act of washing in these places is esteemed equally as efficacious for purifying, and absolving from sin, as the far-famed Ganges.

ROADS AND PASSES.

There are several principal roads that lead through this country from the neighbouring districts. The first is a high road that leads from Tanjore by Kottapatnam, proceeds along the sea-coast, and is much frequented by pilgrims who travel to and from the Ganges to Rámésware. About two miles from Kottapatnam the road leads into the Tanjore country, crosses a rivulet, and proceeds to Sundrapándipatnam. In its progress further, about five miles, it crosses the Pámban-ár (which here forms the general boundary between Tanjore and Sivaganga); and about a mile south, leads near a fine chattiram in the Sivaganga limits; west of Sundrapándipatnam, about two miles, it crosses the Páshi river; and, at a mile further, the Verashelai, and thence passes by Tondé, where several cross roads intersect. Leaving Tondé, it crosses the Munnimutu-river, and a few other small rivulets, and, at the distance of about eight miles, is intersected by the Kollaikarai-ár, and, passing by Tirupálagudi in its progress, it touches at Dévipatnam, after which, crossing a few brooks, it separates into two roads; the one leading along the coast toRáméswara, the other, crossing the Vigay river, enters Rámnád, making through the whole of its course a distance of nearly fifty miles. This, although a carriage-road, is very inconvenient, owing to the heavy sand along the sea-coast. The second is a high road that leads from Trichinopoly to Rámnád, *viâ*

Pudukotta, enters this country on the north by Sheraganúr, passes by Kunnangudi, Mangalagudi, and Tiruvadanari, where it is intersected by several cross roads leading to the coast; thence it touches at the village Arnutmangalam, crosses the Kottaikarai-ár, and leads off on the west by Armukam-kotta to Rásingamangalam, proceeds to Sholandúr, and passing below the banks of two large lakes, touches at Peruvial, near which it is intersected by several water-courses, and latterly passes by Pillengudi on the north bank of the Vigay river to Rámnád. This is one of the grand carriage-roads, but is in a bad state owing to the frequent intervention of paddy-fields, which render it altogether impassable in the rainy seasons. A third road, also leading from Trichinopoly, separates into two parts at Tripatúr; the one leads *viâ* Sivaganga, and the other by Kaulear-kovil, and these joining at Yellangudi, the road enters this district about one mile and a half west of Ninar-kovil, and, in its progress, crosses the Vigay, passes near a fine pavilion, called Chetti-Mattam, where it joins the high road leading from Madura to the capital, and proceeds along the south bank of the Vigay below Gangakondán, and, re-crossing the river again at three other places, two miles distant from each other, passes by Mothalúr to Rámnád. The state of the road is tolerably good, but much inconvenience is felt by the intersection of the Vigay river at several places. The fourth is a high road that leads from Madura *viâ* Mánamadura, enters this province immediately after crossing the Vigay river by Tholashatanúr, and proceeds along the south bank for three miles, touching at Parmagudi, a fine, large, and populous town, where there are two or three substantially built pavilions for the accommodation of travellers. The road runs through the town along the southern bank, about ten miles to Chetti-Mattam, and passes by Wurapilli, in the interval of which it crosses many canals branching from the Vigay, which render the road unfit for carriages; it then leads eastward to Rámnád. The fifth is also a high road that leads from Madura to Rámnád *viâ* Avúr. It enters this country at a village called Utchampalli, and, in its progress, crosses the Sheverikotta river, near its junction with the Kundár, touches at Tiruchuli, crosses the latter river, and proceeds to Shadapúram, where it separates into two different routes, the one leading to Kámúri, and the other to Abramam: the one that leads to the latter place passes by Anakolam, Mandelmánikam, and Nártakurchi, next touches at Abramam, and, in its progress to Rámnád, passes by the intermediate villages Perrúnkurnai, Alenganar, Chetra, Wulayar, Yettivial, and Lánthamattam. This road is extremely good, owing to the high and level surface of the country. The sixth, a high road that leads from Madura, Tiruchuli, and Kámúri, to Rámnád, touches at Kámúri, and after crossing the Kundár river on the east of the town, it intersects the high road from Abramam at the distance of five miles.

This is also a good carriage-road from the evenness of the country. The seventh, a high road leading from Tinnevelly to Rámnád, enters this province on the west of Kunirajapúram, touches at Narripúr, and, in its way, passes by Sholagudi, when it crosses the Kundár, and proceeds about five miles between a range of sand-hills, touches at Kilashelvanellúr, from which place a road separates to Kilakarai by the villages Kilakedáram and Sivakolam, where it crosses a rivulet and passes by Yérvádei to Kilakarai, and from thence proceeds along the sea-coast *viâ* Mutupetta and Vaidálai, to Pámban and Rámésware. The road that continues from Shelvanellur to Rámnád, touches at Kothenkolam, a small village (about two and a half miles distant), and thence at Shekull, three miles from the latter, and passes through Tirukoshamangai, which is seven miles short of Rámnád. The eighth is a sea-coast road leading from Dévipatnam towards Autankarai and Pullimat'ham, where it crosses the ferry to Pámban, and proceeds to Ráméswara, being in this part paved with stones. All along this road are spacious and durable pavilions and chattirams for the accommodation of travellers and pilgrims. Several cross-roads intersect each other in all directions throughout the country, which, though not answering for carriage-roads, are much frequented by a class of people who chiefly trade in salt.

SOIL AND PRODUCTIONS.

The soil in this province is composed of various sorts, and, though generally fruitful, is not without some predominant disadvantages, a proof of which has been experienced by the continual emigration of the inhabitants from this to the neighbouring countries, especially within the last four years, during which period a great scarcity and mortality has prevailed, arising from a failure of rain; and the number of inhabitants who have abandoned this province from indigence, and its concomitant evils, is estimated to be not less than 150,000 souls, or nearly half its population.

The soil, though not of a very rich kind, yet, aided by enlightened husbandry, may vie in fertility with the best in the neighbouring countries, and produces early and excellent crops of paddy and of dry grain. The most fruitful soil consists of a deep black loam, which is prevalent towards the westward; the culture on these lands yields an abundant crop of cotton and dry grain. Coriander and Kadalai* are well cultivated in parts of Abramam and Kámúri. The soil next in quality is a red loam; and, inferior to these, is the black and red, light and sandy soils. Vegetation thrives remarkably upon the latter, which is common about the sea-coast towns, contiguous to which the grounds are inclosed and divided into small gardens. The productions consist of paddy of various kinds, several sorts of dry grain, horse gram, and a variety of other pulse, rape-seed, and oil nuts; cotton in great plenty; and the choya-vér grows spontaneously about the sea-coast and the islands. Besides the latter, there is in the western districts a small production of a thistle-plant, from the flower of which a reddish colour is extracted, and the cloths that are dyed with this are held in high estimation by the natives. The garden productions consist of raggy, beetle, pumpkins, saffron, limes, tobacco, yams, potatoes, cucumbers, sugar-canes, and plantains; the two latter, however, are not only rare, but of a meagre sort. The northern districts, as well as the neighbourhood of several of the sea-port towns, are very productive of the Palmyra, from the toddy of which a considerable quantity of coarse sugar is manufactured.

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* A kind of pease, much used in Bengal and Upper Hindústán, and in the south commonly called Bengal gram.

MANUFACTURES, IMPORTS, AND EXPORTS.

As a commercial province, and for manufactures, Rámnád is distinguished beyond many others, and principally for the manufacture of cotton cloths; the first of which is at Parmagudi, where the chief occupation of the inhabitants is making printed cloths, chintzes, silks, elegant silk carpets, red and blue striped cotton carpets, muslins, dúpettas, turbans, dimities, izaries, ginghams, cambrics, &c. Kílakarai and Dévipatnam are fine ports, the trade of which is very considerable; they are consequently the resort of many respectable merchants from all parts, whereby these places have become rich and populous. Kílakarai is reckoned next to Parmagudi for the manufacture of fine cloths, muslins, &c. A few other places are noted for long cloths of good quality, viz. Kámuri, Abramam, Arpukotta, Pálayampatti, Kuddeladi, Yekugudi, Punnakolam, Chittarkotta, Numbuthullai, Tindey, and Kottapatnam; and those of a coarse quality, commonly worn by the inhabitants, are made almost in every village in the province. Salt is manufactured in great plenty in the neighbourhood of the sea-coast towns and villages, but it is entirely under the management of the servants of the government. Besides the manufacture of this article, a prodigious quantity of it is gathered from the extensive salt-marshes, in which, on the evaporation of the water, a thick incrustation of salt, very white and fine, is left on the surface. Except at Pundlegudi, saltpetre is no where manufactured in this province.

The chank fishery commences in April on the eastern coast of Rámnád, and continues till the month of September; and, on the southern coast, from October, continuing till march. It is usually rented by the zemíndár at not less than six thousand pagodas annually. The chanks fished on the eastern coast are reckoned better than those of the southern. A comparative rate has long been established at one hundred and thirty-five chanks per star-pagoda, while those of the southern-coast are sold at one hundred and sixty-two per pagoda. The number of chanks annually fished amounts to upwards of a million. The country arrack is distilled in several places throughout this province.

The imports are shawls, woollen cloths, wheat, sugar, sugar candy, pepper, nuts, nutmegs, cinnamons, cloves, cardamums, mace, brimstone, quicksilver, iron, pearls, corals, and a variety of precious stones; teak-wood, black, and Ceylon wood; red and yellow ochre; and, in the time of scarcity, grain is imported hither from the western, as well as from the Tanjore countries. The chief trade of this province consists in the exportation of manufactured cloths of various kinds. The chanks are taken to Bengal, and the choya-vér to the northern countries; and, during a plentiful season, paddy, and other grain, are also exported. Salt is the principal commodity of export to the inland countries.—*Journal of the Royal Asiatic Society of London*, No. 5. page 165—188.

Second Report of the Meteorological Committee of the South African Literary and Scientific Institution.

The Meteorological Committee having proceeded to draw up and circulate a compendious body of instructions for making and registering Meteorological Observations[*]—the same which forms a part of their first Report to this Institution—and having, moreover, distributed in various quarters copies of the printed forms alluded to in p. 16 of that Report—have received in consequence communications from various parts of this colony, in most instances expressing great willingness to co-operate in the observations recommended, but in almost every case complaining of the want of meteorological instruments, and in some, requesting a supply. Your committee are not without hopes of being enabled in some instances to supply the deficiency. Meanwhile they have to acknowledge the receipt of a regular return, according to their printed form, from Captain Wolfe, Commandant of Robben Island, of the state of the barometer, interior and exterior thermometer, wind, and weather, at the hours agreed upon, during the whole of January, February, March, and April, of the present year, with the promise of their future regular continuance. In this communication the observations appear to have been made with such regularity, and the instructions of the Committee generally so well attended to, as leads them to regret that the barometer employed should (as appears by the numbers set down) be one capable of being read only to the nearest tenth of an inch, and to render them very desirous to supply a better. A spare barometer belonging to the Royal Observatory has been accordingly placed at their disposal by the Astronomer Royal, and so soon as it shall be furnished with a new tube, and otherwise repaired, will be forwarded to Captain Wolfe, with a request that his series of observations may be continued with this instrument, instead of that at present used;—Robben Island being in many respects a highly advantageous station for acquiring an insight into the meteorology of this point of the coast, much more so than Cape Town itself.

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[*] Vide No. 14 of this Journal, page 196.—The tables of Meteorological Observations sent from Madras will, we hope, have reached the Institution, and we request the conductors to favor us with copies of their interesting Reports, by the earliest opportunities on all occasions. The present Number of this Journal contains tables of horary observations made at three widely separated stations of the peninsula of India, and we invite Meteorologists in other quarters to follow the suggestions of Sir John Herschel.—*Editor Madras Journal.*

From Worcester, your Committee have received a register of the thermometer only (having no barometer), from P. J. Truter, Esq. Civil Commissioner for the district, for the month of January of the present year. Having only one thermometer, which is used both for ascertaining the interior temperature and that of the outer air, the Committee would recommend that he should be supplied with at least one other, and be requested, until a barometer can be procured, to fill up the column of the in-door thermometer with observations of the hygrometric state of the air, as ascertained by the depression of temperature produced by wrapping the bulb in wet linen or cotton, and suspending it freely, in the manner recommended in p. 12 of their Instructions.

The Committee have also received from the Astronomer Royal, and from Sir J. Herschel, hourly Observations at the Solstices of December 1834 and June 1835, and the Equinox of March 1835, made according to the plan proposed in their printed Instructions. The comparison of these observations has shewn, that, in this locality at least, even at stations so near together as Feldhausen and the Royal Observatory, the fluctuations of atmospheric pressure are very far from nicely corresponding, and that, so long as any wind subsists in a mountainous district, the atmospheric strata can by no means be regarded as horizontal. The calm, however, having been complete and uninterrupted for ten successive hours on the night of the 22d ult., afforded an excellent opportunity for determining the difference of level of the two stations, which appears to be 129 feet 8 inches, subject to a trifling correction for the zero points of the barometer, which remains to be more exactly ascertained.

Communications have been received by the Committee from Sir E. Ryan, Chief-Justice of Calcutta, containing a Register of the barometer and thermometer, kept by himself during his passage from Table Bay to Calcutta, in the months of December, January, and February 1834-5; from ——— McHardy, Esq. Surgeon on board the Mountstuart Elphinstone, containing a similar register made in the voyage of that ship from Table Bay to London, during parts of the months of September and October 1834: from Captain Wauchope of H. M. S. Thalia, containing extracts from a Journal of the barometer and htermometer, &c. observed on board of H. M. S. Eurydice, off Saldanha Bay, during a heavy gale in 1819, as also in Table Bay during a violent north-wester in 1817; and, lastly, from H. W. Innis, Esq. Surgeon on board the Sherburne, containing a similar register kept during the approach to and after the arrival of that ship in Table Bay in January 1835.

Of the two former of these communications (those of Sir E. Ryan and of Mr. McHardy), it must be observed, that they both, but especially the first, afford strong corroborative, and indeed quite decisive, evidence of that important meteorological fact, of a considerable depression of the barometer in approaching to the equator from extra-tropical latitudes. Sir E. Ryan's barometer, previous to his sailing, was compared, through the medium of a portable barometer in possession of Sir J. Herschel, with the Mural Circle barometer of the Cape Observatory, the difference of which, from the standard of the Royal Society, had been previously ascertained by two distinct comparisons, agreeing perfectly *inter se*, made by the intervention of the above mentioned portable barometer which had been brought to the Cape by Mr. Henderson and again transported by him to London. By these comparisons, it was found that Sir E. Ryan's barometer required a correction of—0.116 in. to reduce it to the Royal Society's standard. This correction being applied, and the reading so corrected being reduced to the freezing temperature, and classed into groups in zones of 10° in breadth, proceeding northwards and southwards from the equatorial zone (between the latitudes 5° N. and 5° S.) according to the observed latitudes of the ship at noon of each day, give as follows:—

Limits of the Zone of Latitude.	Number of Days' Observations.	Mean Pressure observed in Inches.	Mean corresponding observed Latitude.
Equatorial Zone.			
Lat. 5° N. to 5° S.	7	29.821	0° 41'
— 5 — to 15 —	10	29.849	9 50
— 15 — to 25 —	8	30.040	19 12
— 25 — to 35 —	10	30.125	31 0
— 35 — to 40 —	24	29.934	38 25

The observations of Mr. McHardy, though extending only to latitudes south of the equator, and, though evidently made with far less care, and with an instrument in which the fluctuations arising from the motion of the ship are very imperfectly destroyed, yet, when reduced and grouped in a similar manner, afford a result agreeing in their general tenor very satisfactorily with those of Sir E. Ryan. To render them comparable, as the zero of Mr. McHardy's barometer is unknown, a correction of—0.188 has been applied to all his reduced observations, by which the equatorial indications of the two barometers are made to agree, and the following table exhibits their results when so reduced, grouped, and corrected :—

Limits of the Zone of Latitude.	Number of Days' Observations.	Mean Pressure in Inches.	Mean corresponding Latitude.
Lat. 0° N. to 5° S.	8	29.821	1° 42'
— 5 — to 15 —	5	29.802	9 20
— 15 — to 25 —	6	29.960	19 41
— 25 — to 35 —	16	30.085	31 20

The total depression concluded from the latter series of observations agrees very nearly in amount with that stated by Sir J. Herschel, as the result of his own observations during his voyage from England. The general fact may now therefore be looked upon as unequivocally established, and it is hoped that it will henceforth attract the attention of all voyagers ; and that observations will be diligently accumulated for the purpose of ascertaining the law of variation of atmospheric pressure in all latitudes both within and beyond the tropics, and in either hemisphere, since it is very possible that the same exact law may not be found to apply to both, and that the Atlantic, Indian, and Pacific Oceans may offer differences depending on their different extent and relation to the continents adjacent to them.

If, in a report like this, it be allowed to speculate on the causes of meteorological phenomena, it appears extremely probable that the equatorial depression in question arises from the same cause which produces the trade winds, viz. the rarefaction and consequent ascent of the equatorial air, which, although constantly supplied from the extra-tropical latitudes, is yet not supplied *instanter*, nor without a due dynamical motive force, which, in a free elastic fluid, *can* be no other than an excess of pressure on the side from which the supply is drawn, or (which comes to the same thing) a diminution of it, in the nature of a " suction," on that side towards which the superficial currents rush; which excess and diminution obviously arise from the overflow of the unsustained portion of atmosphere above the equatorial zone into the regions beyond. The inquiry, therefore, connecting itself as it does, with all the greater phenomena of meteorology, assumes a high degree of interest, and will no doubt be studied with the perseverance and exactness it merits.

A series of observations of the heights and times of high and low water at Simon's Bay, extending from January 26, to June 30, has been obligingly submitted to the consideration of the Meteorological Committee, by J. Deas Thomson, Esq. and the Astronomer-Royal. It has not yet been possible to compare them with any theory, and indeed it would be premature to attempt it here, as they will require to be combined with the mass of knowledge now accumulating on this subject in Europe, to render them in any degree available. One remarkable result, however, may be mentioned here, which offers itself on a very cursory inspection of the heights, as compared with the declinations of the Sun and Moon, viz. that while the monthly fluctuation of the mean sea-level, arising from the *moon's* alternate occupation of the northern and southern hemisphere, is scarcely perceptible, amounting hardly to two inches, its annual variation, due to the similar approach of the sun to the northern and southern solstice, is much more considerable, and forms indeed a prominent feature in the Tides of this coast, amounting to no less than eight inches, or nearly a fifth of the average difference between high and low water—as the following brief Table will shew—in which the interval embraced by the observations is divided, not as usual into lunations from full to full or from new to new Moon, but into periods marked by the moon's passing from south to north of the equinoctial. By this division the effect (if any) of the moon's change of declination compensates itself, and leaves the solar effect in evidence. The cause of the prominence thus given to this part of the sun's agency, appears to lie in the length of its period compared with the moon's, which gives time for the waters of the whole ocean to accommodate their general level to the actual force, by bodily transfer from one part of the globe to another, and by assuming, at each instant (what the tides of short period have never time to do), very nearly the figure of equilibrium due to this particular modification of the disturbing forces.

Observed Mean Positions of the Mid-water mark on the Float of the Tide-gauge at Simon's Bay, during successive intervals of the Moon's Transit from North to South of the Equinoctial.

Limits of intervals	No. of Tides observed.	Heights of Mid-water on the Gauge.	REMARKS.
Jan. 26 to Feb. 16	22	4 feet 4.38 in.	period incomplete.
Feb. 17 to Mar. 15	27	4 .. 2.35 ..	
Mar. 16 to April 11	27	3 .. 10.83 ..	
April 12 to May 9	28	4 .. 0.22 ..	
May 10 to June 5	27	3 .. 9.52 ..	
June 6 to June 30	25	3 .. 8.37 ..	period incomplete.

At the meetings of the Institution of Wednesday September 3, and October 1, Sir J. Herschel stated that he had examined the Meteorological Journal kept at the Port-Office by Mr. M'Cleod, under the direction and superintendence of Captain Bance, during 58 months, commencing with October 15, 1828, in which are registered the heights of the barometer with the temperature of the instrument, for the hour of 9 A. M., noon, and 3 P. M., with the usual notices of wind and weather, and that having reduced and interpolated them by graphical projection he had been led to the following conclusions:—

1st, That the atmospheric pressure at Cape Town is subject to a considerable and very regular annual fluctuation, amounting (when reduced to a temperature of 32° Fahrenheit) to 0.287 in. —the highest level being attained about the 16th of July, and the lowest about the 16th of January, on an average of five years.

2d, That the barometric pressure is also subject to a regular diurnal fluctuation, whose average amount, on a mean of the whole year, may be stated at 0.027 in.; the highest pressure taking place at or about 9 A. M., and the lowest (so far as can be gathered from observations made only at the hours above named) at 3 P. M.

3d, That this daily oscillation is itself subject to an annual alternate increase and diminution—the limits being 0.0198 in. and 0.0322—the former, or lesser diurnal variation, corresponding to the middle of January, and the latter or greater to the beginning of July.

4th, That these fluctuations are maintained with such regularity, that there is not a single month in the fifty-eight examined, in the mean of which the daily oscillation does not appear; and that in the annual oscillation (with exception of one remarkable anomaly, produced by the tremendous storm of July 1831) not only does every year exhibit the fluctuations in question, but its progress is marked by similar stages, or phases of increase and diminution; the most remarkable of which is a temporary suspension of the regular rapid rise of the mercury towards its maximum, usually taking place about the latter end of May or beginning of June.

5th, That, contrary to usually received notions, the rainy season at the Cape corresponds to a *generally* elevated state of the barometer, although it is true that particular storms of wind and rain are often marked by a temporary depression.

Sir J. Herschel further observed, that the amount of the annual barometric variation at the Cape corresponds pretty nearly with the amount of a depression of the mercury, which he stated to have been observed by himself in his voyage hither, at and near the equator, below its habitual state in the extra-tropical regions—a depression then noticed, as he at that time supposed for the first time, but which it appears had also been (very recently) noticed and made the subject of inquiry and numerical computation by Professor Schow of Copenhagen, in a paper published in the Annales de Chimie for June 1833.

Sir J. Herschel also farther stated, that the mean annual barometric fluctuation at Calcutta, on the average of between two and three years' observations made by Mr. Prinsep, examined by him, appears to be much greater than that at the Cape, and, what is very remarkable, in a contrary direction, the maximum of Calcutta corresponding to the minimum at the Cape. And he attributes this to an actual bodily transfer of a portion of air from hemisphere to hemisphere, by the alternate heating and cooling of the two hemispheres, as the sun crosses from side to side of the equator. The effect of this cause, which he considers to be general over the whole earth, will be to modify the regular and constant effects of the Trades, by a set of periodical winds differing materially in their character from local monsoons, and to this cause he is disposed to attribute the observed annual oscillation of the extreme north and south limits of the Trade winds.

The northern hemisphere, he further observed, being, by reason of its greater quantity of land, more superficially heated than the southern, it should be expected that the mean pressure beyond the southern tropic should exceed that beyond the northern, and he suggested this as a subject worthy of examination by meteorologists properly situated in both hemispheres.

Lastly, he observed, that severe gales, occurring whether in summer or winter, appear to depend on causes entirely extraneous to the regular periodical fluctuations of pressure, and are probably dependent on causes of a local and transient nature—but that *a correspondence of extraordinary seasons* in distant parts of the globe, may be expected to accompany great occasional deviations from the usual law of these fluctuations in any given place, and that it is far from impossible that an assiduous attention to this point may ultimately enable us to predict their occurrence.

The series of observations at the Port-Office being still in progress, the foregoing results are not considered as final; but whatever modifications future years' observations may necessitate, will be from time to time inquired into and reported.—*Edinburgh New Philosophical Journal for July—October* 1836.

LITERARY AND SCIENTIFIC INTELLIGENCE, AND MISCELLANEA.

Encouragement to Science by the Honourable the Court of Directors of the East India Company.—Having now dwelt at some length upon those aids and encouragements to science which emanate from public societies and institutes formed for that express purpose, we must be allowed to advert to another association, whose objects, indeed, are commercial, but whose patronage of science in all that relates to the civil and natural history of Asia is without parallel, and entitles THE HONOURABLE COMPANY OF MERCHANTS TRADING TO THE EAST INDIES, not only to a place among the scientific institutions of this empire, but to rank with the first and foremost of those in Europe. We here look to this Company only in its connection with the literature and science of the East. The liberality which the different Courts of Directors have shown, for a long series of years, in bringing to light the ancient records of that vast empire over which their authority extends, is attested by the publications these materials have given rise to, and the efficient patronage that has uniformly been extended to their authors. Every thing, in short, which could illustrate the ancient state of those singular nations now under the dominion of Britain, has been studiously sought for by the servants of the Company, and deposited in their archives. The Asiatic Society, celebrated for its learned Transactions since the days of Sir Wm. Jones, owed its origin to their fostering care; while the splendid library and collection of Oriental MSS. at the India House attest the feelings which have so long pervaded their councils. If we turn, on the other hand, to what has been done for elucidating the natural history of their possessions, the result is still more conspicuous. A botanical garden, worthy of an eastern monarch, superintended by distinguished botanists, having at their command all necessary assistants, has disseminated the splendours of the Indian flora over all similar establishments in Europe. Yet this liberality is not confined to public gardens, or to favoured botanists. Any individual of respectability, upon his return to Europe, may receive a collection of seeds and roots from these gardens, free of expense. Nor are these all the benefits resulting to the botanical world from the munificence of the Company. The different provinces of India have been explored by competent botanists; and thousands and tens of thousands of dried specimens, prepared under their superintendence, have been transmitted to England, arranged into separate collections, and then distributed among the scientific botanists of Europe. The same patronage has been extended to every thing regarding zoology. No sooner had the British arms taken possession of Java, than arrangements were made for securing the services of Dr. Horsfield, an eminent naturalist then residing in the island, and his valuable collections were made over to the Company. On the arrival of Dr. Horsfield in this country, these scientific treasures were deposited in the India House; and when suitable arrangements had been made in the museum for their reception, they were opened to the public and to men of science: and the "Zoological Researches in Java" were soon after published, under the Company's patronage. The chief results of Dr. Horsfield's discoveries being thus given to the world, the rich collection of duplicate specimens was ordered to be distributed, like those of the plants, among the different public museums, and the eminent zoologists, both in Britain and on the Continent. The splendid collection of insects, equally rich in duplicates, will, no doubt, be employed in a manner equally calculated to benefit science, so soon as the honour attached to their discovery and investigation has been secured. In short, in whatever light we view the scientific patronage exercised by the India Company, it is scarcely possible to do justice to that munificent spirit which is apparent in all the details.—*A Preliminary Discourse on the Study of Natural History.—By William Swainson, Esq.*—Cab. Cyc. p. 329—331.

DR. BUCKLAND'S *Geology and Mineralogy*—The SIVATHERIUM.—The long expected volumes of the Bridgewater Treatises, containing DR. BUCKLAND'S treatise on Geology and Mineralogy, have, at length, reached India. The following pssage relates to the interesting fossil, an account of which appeared in the 12th number of this Journal.

"An account has recently been received from India of the discovery of an unknown and very curious fossil ruminating animal, nearly as large as an elephant, which supplies a new and important link in the Order of Mammalia, between the Ruminantia and Pachydermata. A detailed description of this animal has been published by Dr. Falconer and Captain Cautley, who have given it the name of Sivatherium, from the Sivalic or Sub-Himalayan range of hills in which it was found, between the Jumna and the Ganges. In size it exceeded the largest Rhinoceros. The head has been discovered nearly entire. The front of the skull is remarkably wide, and retains the bony cores of two short thick and straight horns, similar in position to those of the four-horned Antelope of Hindostan. The nasal bones are salient in a degree without example among Ruminants, and exceeding in this respect those of the Rhinoceros, Tapir, and Palæotherium, the only herbivorous animals that have this sort of structure. Hence there is no doubt that the Sivatherium was invested with a trunk like the Tapir. Its jaw is twice as large as that of a Buffalo, and larger than that of a Rhinoceros. The remains of the Sivatherium were accompanied by those of the Elephant, Mastodon, Rhinoceros, Hippopotamus, several Ruminantia, &c.

"It is stated (p. 88) that there is a wider distance between the living Genera of the Order Pachydermata than between those of any other Order of Mammalia, and that many intervals in the series of these animals have been filled up by extinct Genera and Species, discovered in strata of the Tertiary series. The Sivatherium forms an important addition to the extinct Genera of this intermediate and connecting character."—*Supplementary Notes.*

In the number of the *Journal of the Asiatic Society of Bengal* for February 1837, we find an account and representations of further fragments of this very interesting fossil animal, from which we extract the following.

"*Additional fragments of the Sivatherium.*—Before Colonel Colvin's departure for Europe, we requested permission to take a cast of the beautifully preserved lower jaw of the *Sivatherium* which he exhibited at the Government House scientific party in January last. In further token of his zeal for science, and of his ever readiness to oblige, he has, even in the hurry of embarkation, favoured us with the accompanying lithographic drawings of the same jaw, and of the larger fragment of the occiput also on its way to adorn some cabinet of fossil osteology of his native land. This fragment is the more valuable on account of its being perfect in the parts deficient in Dr. Falconer's specimen.

"'I herewith send you two plates of the *Sivatherium*, one of the portion of the head I was fortunate in having brought in from the lower hills below and west of *Náhan* just before I left *Dádúpur.* It arrived encumbered with a good deal of hard sandstone matrix, most of which I had cleared away. This specimen is valuable, though it has no teeth, from having the occiput very entire, and from its proving the accuracy of Dr. Falconer's assumption, founded on examination of the original head, that the animal had four horns with bony cores, as this has the offset of one of the back branched horns very clearly marked; suitable to which I may mention that Captain Cautley has found in his collection a large flat horn.

"'For the left lower jaw of the *Sivatherium*, I am indebted to Conductor W. Dawe, of the Canal Department, for whom it was brought in, inclosed in a mass of similar sandstone, from near the sources of the *Sombe* river, north of *Dádúpur* and east of *Náhan*, shortly before I came away. It is a very perfect and beautiful specimen, with its molars, four in number, almost quite entire, and is the specimen which you have moulded.'"

Fossil Remains of naked Mollusks, Pens, and Ink-Bags of Loligo. —It is well known that the common Cuttle Fish, and other living species of Cephalopods,* which have no external shell, are protected from their enemies by a peculiar internal provision, consisting of a bladder-shaped sac, containing a black and viscid ink, the ejection of which defends them, by rendering opaque the water in which they thus become concealed. The most familiar examples of this contrivance are found in the Sepia vulgaris, and Loligo of our own seas.

It was hardly to be expected that we should find, amid the petrified remains of animals of the ancient world (remains which have been buried for countless centuries in the deep foundations of the earth), traces of so delicate a fluid as the ink which was contained within the bodies of extinct species of Cephalopods, that perished at periods so incalculably remote; yet the preservation of this substance is established beyond the possibility of doubt, by the recent discovery of numerous specimens in the Lias of Lyme Regis,† in which the ink-bags are *preserved* in a fossil state, still distended, as when they formed parts of the organization of living bodies, and retaining the same jux-taposition to a horny pen, which the ink-bag of the existing Loligo bears to the pen within the body of that animal.

Having before us the fact of the preservation of this fossil-ink, we find a ready explanation of it, in the indestructible nature of the carbon of which it was chiefly composed. Cuvier describes the ink of the recent Cuttle Fish as being a dense fluid of the consistence of pap "bouillie," suspended in the cells of a thin net-work that pervades the interior of the ink-bag; it very much resembles common printers' ink. A substance of this nature would readily be transferred to a fossil state, without much diminution of its bulk.‡

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* The figure of the common Calmar, or Squid (Loligo Vulgaris Lam.—Sepia loligo of Linnæus), illustrates the origin of the term Cephalopod, a term applied to a large family of molluscous animals, from the fact of their feet being placed around their heads. The feet are lined internally with ranges of horny cups, or suckers, by which the animal seizes on its prey, and adheres to extraneous bodies. The mouth, in form and substance resembles a Parrot's beak, and is surrounded by the feet. By means of these feet and suckers the Sepia octopus, or common Poulpe (the Polypus of the ancients), crawls with its head downwards, along the bottom of the sea.

† We owe this discovery to the industry and skill of Miss Mary Anning, to whom the scientific world is largely indebted, for having brought to light so many interesting remains of fossil Reptiles from the Lias at Lyme Regis.

‡ So completely are the character and qualities of the ink retained in its fossil state, that when, in 1826, I submitted a portion of it to my friend Sir Francis Chantrey, requesting him to try its power as a pigment, and he had prepared a drawing with a triturated portion of this fossil substance; the drawing was shown to a celebrated painter, without any information as to its origin, and he immediately pronounced it to be tinted

In a communication to the Geological Society, February 1829, I announced that these fossil ink-bags had been discovered in the Lias at Lyme Regis, in connexion with horny bodies, resembling the pen of a recent Loligo.

These fossil pens are without any trace of nacre, and are composed of a thin, laminated, semi-transparent substance, resembling horn. Their state of preservation is such as to admit of a minute comparison of their internal structure with that of the pen of the recent Loligo; and leads to the same result which we have collected from the examination of so many other examples of fossil organic remains; namely, that although fossil species usually differ from their living representatives, still the same priniciples of construction have prevailed through every cognate genus, and often also through the entire families under which these genera are comprehended.

The petrified remains of fossil Loligo, therefore, add another link in the chain of argument which we are pursuing, and aid us in connecting successive systems of creation which have followed each other upon our Planet, as parts of one grand and uniform Design. Thus the union of a bag of ink with an organ resembling a pen in the recent Loligo, is a peculiar, and striking association of contrivances, affording compensation for the deficiency of an external shell, to an animal much exposed to destruction from its fellow-tenants of the deep; we find a similar association of the same organs in the petrified remains of extinct species of the same family, that are preserved in the ancient marl and limestone strata of the Lias. Cuvier drew his figures of the recent Sepia with ink extracted from its own body. I have drawings of the remains of extinct species prepared also with their own ink; with this fossil ink I might record the fact, and explain the causes of its wonderful preservation. I might register the proofs of instantaneous death detected in these ink-bags, for they contain the fluid which the living sepia emits in the moment of alarm; and might detail further evidence of their immediate burial, in the retention of the forms of these distended membranes; since they would speedily have decayed, and have spilt their ink, had they been exposed but a few hours to decomposition in the water. The animals must therefore have died *suddenly*, and been *quickly* buried in the sediment that formed the strata, in which their petrified ink and ink-bags are thus preserved. The preservation also of so fragile a substance as the pen of a Loligo, retaining traces even of its minutest fibres of growth, is not

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with sepia of excellent quality, and begged to be informed by what colour-man it was prepared. The common sepia used in drawing is from the ink-bag of an oriental species of cuttle-fish. The ink of the cuttle-fishes, in its natural state, is said to be soluble only in water, through which it diffuses itself instantaneously; being thus remarkably adapted to its peculiar service in the only fluid wherein it is naturally employed.

much less remarkable than the fossil condition of the ink-bags, and leads to similar conclusions.[*]

We learn from a recent German publication (Zeiten's Versteinerungen Württembergs. Stuttgart, 1832, Pl. 25 and Pl. 37), that similar remains of pens and ink-bags are of frequent occurrence in the Lias shale of Aalen and Boll.[†] Hence it is clear that the same causes which produced these effects during the deposition of the Lias at Lyme Regis, produced similar and nearly contemporaneous effects, in that part of Germany which presents such identity in the character and circumstances of these delicate organic remains.

Paley has beautifully, and with his usual felicity, described the Unity and Universality of Providential care, as extending from the construction of a ring of two hundred thousand miles diameter, to surround the body of Saturn, and be suspended, like a magnificent arch, above the heads of his inhabitants, to the concerting and providing an appropriate mechanism for the clasping and reclasping of the filaments in the feather of the Humming-bird. The geologist descries a no less striking assemblage of curious provisions, and delicate mechanisms, extending from the entire circumference of the crust of our planet, to the minutest curl of the smallest fibre in each component lamina of the pen of the fossil Loligo. He finds these pens uniformly associated with the same peculiar defensive provision of an internal ink-bag, which is similarly associated with the pen of the living Loligo in our actual seas; and hence he concludes, that such a union of contrivances, so nicely adjusted to the wants and weaknesses of the creatures in which they occur, could never have resulted from the blindness of chance, but could only have originated in the will and intention of the Creator.—*Bridgewater Treatises.—Buckland's Geology and Mineralogy.* Vol. I. p. 303—310.

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[*] We have elsewhere applied this line of argument to prove the sudden destruction and burial of the Saurians, whose skeletons we find entire in the same Lias that contains the pens and ink-bags of Loligo. On the other hand, we have proofs of intervals between the depositions of the component strata of the Lias, in the fact, that many beds of this formation have become the repository of Coprolites, dispersed singly and irregularly at intervals far distant from one another, and at a distance from any entire skeletons of the Saurians, from which they were derived; and in the further fact, that those surfaces *only* of the Coprolites, which lay *uppermost* at the bottom of the sea, have often suffered partial destruction from the action of water before they were covered and protected by the muddy sediment that has afterwards permanently enveloped them. Further proof of the duration of time, during the intervals of the deposition of the Lias, is formed in the innumerable multitudes of the shells of various Mollusks and Conchifers which had time to arrive at maturity, at the bottom of the sea, during the quiescent periods which intervened between the muddy invasions that destroyed, and buried suddenly the creatures inhabiting the waters, at the time and place of their arrival.

[†] As far as we can judge from the delineations and lines of structure in Zeiten's plate, our species from Lyme Regis is the same with that which he has designated by the name of Loligo Aalensis; but I have yet seen no structure in English specimens like that of his Loligo Bollensis.

New method of Boring.—An economical and easy method of sinking Artesian Wells and boring for coal, &c. has recently been practised near Saarbrück, by M. Sellow. Instead of the tardy and costly process of boring with a number of iron rods screwed to each other, one heavy bar of cast-iron about six feet long and four inches in diameter, armed at its lower end with a cutting chisel, and surrounded by a hollow chamber, to receive through valves, and bring up the detritus of the perforated stratum, is suspended from the end of a strong rope, which passes over a wheel or pulley fixed above the spot in which the hole is made. As this rope is raised up and down over the wheel, its tortion gives to the bar of iron a circular motion, sufficient to vary the place of the cutting chisel at each descent.

When the chamber is full, the whole apparatus is raised quickly to the surface to be unloaded, and is again let down by the action of the same wheel. This process has long been practised in China, from whence the report of its use has been brought to Europe. The Chinese are said to have bored in this manner to the depth of 1000 feet. M. Sellow has with this instrument lately made perforations 18 inches in diameter, and several hundred feet deep, for the purpose of ventilating coal mines at Saarbrück. The general substitution of this method for the costly process of boring with rods of iron, may be of much public importance, especially where water can only be obtained from great depths.—*Ibid.*—p. 568.

Proceedings of the Zoological Society of London.—Indian Antelope. —Mr. Bennett directed the attention of the Meeting to an interesting series of the *Indian Antelope, Antelope Cervicapra,* Pall., now at the Society's Gardens. It consists of four individuals: an adult and aged male, brought by Col. Sykes from Bombay, and presented by him to the Society nearly five years ago; a younger, yet adult, male, which was presented, in an immature condition, about two years since; an immature male, lately arrived in the Menagerie, and in about the same state of development as that in which the last-mentioned individual was when it was originally presented; and an emasculated individual of full growth. In the older of these *Antelopes* the rich deep colour of the body generally is so intense as almost to approach to black, and the horns are strong and fully developed: the possession of horns and the depth of colouring, which are peculiar to the male sex, are exhibited in it at their maximum. The second individual approximates nearly to it in the degree in which these secondary sexual characters are developed. In the third, the youngest of the series, there exist the horns characteristic of the male, but these organs are yet of small growth, are only beginning to be annulated at their base, and are commencing their first spiral turn; its colour, as is very generally the case among the young of animals that in adult age are differently coloured in the sexes, is that of the female, which in this instance is a dull fawn with a pale stripe along the side: it has, consequently, in these two striking particulars, full evidence of immaturity. The emasculated individual was probably, at the period when that accident or operation occurred which prevented the development of its sexual characters, at nearly the same age as the one last adverted to: it has since continued to increase in bulk, and it even exceeds in size, as often happens in castrated animals, the perfect adult male of the same species: but the secondary sexual characters of the male have not been developed in it: it retains the dull fawn colour of immaturity, and its horns have not acquired the strength, the annulation, or the spiral turns which belong to those of the adult and perfect male. One of the horns has been broken off; perhaps the more readily from some weakness in its structure, consequent on its unimportance to an animal so degenerated: the other retains at a short distance from its normally formed tip, a few rings, but beyond these the surface has become smooth, the substance remains weak and comparatively small, and the direction, instead of being in a succession of spiral turns, is in a single sweep, passing backwards above the base of the ear and then descending along the curve of the neck: it has, though weaker, much of the character of the horns of the African race of *Sheep*. The general appearance of the animal is also sheep-like and tame.

Mr. Bennett proceeded to remark that these animals, although curious and interesting on account of the variations exhibited by them, in accordance with their several conditions, in those acknowledged secondary sexual characters, colour and horns, were yet more interesting when considered with reference to the state of another organ, the use of which has long remained a problem to zoologists, but which, it appeared to him, must be referred to sexual relations; he alluded now to the lacrymal sinus. Referring to its structure as to that of a sac, opening externally by a lengthened slit, but perfectly closed within, he remarked, that that organ could not possibly be in any degree connected with the functions of respiration; there being no aperture through it for the passage of air. Its inner surface is covered by a smooth skin, with a few scattered and very short bristles, and is defended by a dark coloured and copious secretion of ceruminous matter, which has a slight urinous or sexual odour. He did not feel himself competent, he stated, to explain the precise manner in which this organ is available for sexual purposes; yet he felt convinced that such is its use, from the consideration of its relative development in the several *Indian Antelopes* of the Society's Menagerie.

In the more aged of these individuals, as indeed in the adult *Indian Antelope* generally, the large cutaneous follicle beneath the eye known as the lacrymal sinus, is so prominent as to form a most striking feature in the animal's physiognomy: it never appears as a simple slit, its thickened edges pouting so widely as to be at all times partially everted. When the animal is excited, and it is constantly highly excitable, the eversion of the bag becomes complete, and its thick lips being thrown widely back, the intervening space is actually forced forwards so as to form a projection instead of a hollow: the animal is, on such occasions, delighted to thrust repeatedly the naked lining of the sac against any substance that is offered to him, which soon becomes loaded with the odour that has been referred to as belonging to the secretion. In the second individual, although it is perfectly mature, the protrusion of the inner surface of the sac is not quite to so great an extent as in the more aged male; and the less thickened edges of the sinus allow of a nearer approximation to its closure in the unexcited state of the animal. The youngest male has the lips of the sinus small and closely applied to each other, so as to hide completely the whole of the internal lining of the sac, and to exhibit, externally, a mere fissure: in it the lips are but slightly moved when the animal is interested. The emasculated individual, notwithstanding its full growth, has its suborbital sinus, nearly in the same condition as that of the immature male: it is merely a slight fissure, the edges of which are closely applied to each other; and in it those edges do not appear to be at all moved, the animal being generally careless and inanimate. It would consequently seem that the same cause which induced the retention, by this individual, of its immature colours, and which arrested the perfect growth of its horns, was adequate also for the checking of the development of the suborbital sinuses. Those organs, therefore, would appear to be dependent on sexual perfection; and consequently to be, in some manner yet to be ascertained, subservient to sexual purposes, with the capacity for which they are evidently, in the phases of their development, essentially connected.

Mr. Owen, who had conceived it possible that the secretion of these glands, when rubbed upon projecting bodies, might serve to direct individuals of the same species to each other, remarked that he had endeavoured to test the probability of this supposition by preparing a tabular view of the relations between the habits and habitats of the several species of *Antelope*, and their suborbital, maxillary, post-auditory, and inguinal glands; in order to be able to compare the presence and degrees of development of these glands with the gregarious and other habits of the *Antelope* tribe. He stated, however, that it was evident from this table, that there is no relation between the gregarious habits of the *Antelopes* which frequent the plains, and the presence of the suborbital and maxillary sinuses; since these, besides being altogether wanting in some of the gregarious species, are present in many of the solitary frequenters of rocky mountainous districts. The supposition, therefore, that the secretion may serve, when left on shrubs or stones, to direct a straggler to the general herd, falls to the ground.

Mr. Ogilby remarked, with reference to this subject, that he had had opportunities of observing, at the Surrey Zoological Gardens, a female of the *Indian Antelope*, in which, when he first saw her, the lacrymal sinus was in a state of quiescence: but when he observed her again, a month afterwards, and probably in improved condition, that organ was in a state as excitable as it is in the old male of the Society's Gardens. He added, as a general remark, which, however, he stated was not universal, that in intertropical animals the lacrymal sinus is larger than in more northern species, and in those whose range is limited to mountainous districts.

He also described the lacrymal sinus of a species of *Gazelle*, which he had observed after death: it consisted of a gland furnished with six excretory ducts placed nearly in a circle, and with one central duct: from the orifices of these ducts, when squeezed, there issued out strings of a dense ceruminous matter.

Mr. Bennett stated in conclusion, that since making his observations on the *Indian Antelope*, which had led him to form the opinion he had advanced with respect to the use of the lacrymal sinus, he had received from Mr. Hodgson of Nepal, a Corresponding Member of the Society, a letter in which, among other subjects, some remarks are made on this organ as it exists in the *Thar Antelope*, and in the *Cervus Aristotelis*: in the former of those animals, Mr. Hodgson's observations prove that during the breeding-season the lacrymal sinus is in a high state of activity. Mr. Hodgson's letter, which is dated Nepal, June 18, 1835, refers also to other glands in some other *Antelopes*, as will be seen by the following extract.

"The *Chiru Antelope* has exceedingly large inguinal sacs, which hang by a long narrow neck from the loins. The longitudinal quasi maxillary gland of the *Cambin Otan* I doubt the existence of, and believe its 'suborbital sinus' to be similar to that of *Thar*.

"The latter differs essentially from that organ in any *Deer* or *Antelope* I have seen; being furnished with a huge gland, filling the whole cavity or depression on the scull, and leaving the cuticular fold void of hollowness: it is filled up, like the bony depression, by the gland;

whereas the gland of this sinus, in most *Deer* and *Antelopes*, is a tiny thing, and a dubious one. As to any *Cervine* or *Antilopine* animal breathing through the suborbital sinus, it cannot be, unless they can breathe through bone and skin! If you pass a fine probe down the lacrymal duct, you see the probe through the bottom of the osseous depression holding the cuticular fold called the suborbital sinus. But, however thin the plate of bone at the bottom of the former, it is there, without breach of continuity; and the cuticular portion of the apparatus has a continuous course throughout, leaving no access to the inside of the head. I am watching closely a live specimen of *Cervus Aristotelis*, to discover, if I can, the use of this organ. In a recently killed male of this species, I passed a pipe into the nose, up to the site of the suborbital sinus, and tried, in vain, for half an hour, with the aid of a dozen men's lungs, to inflate the sinus. Not a particle of air would pass; nor could I cause the sinus to unfold itself, as the live animal unfolds it, by means of a set of muscles disposed crosswise round the rim of it. In dissecting the sinus, I found only a feeble trace of a gland; so, also, in the *Muntjac*.

"But in the *Thar*, the gland is conspicuous, being a huge lump of flesh, bigger than, and like in shape to, the yolk of an egg. The live *Thar*, too, in the spring especially, pours out a continuous stream of thin viscid matter from the sinus; not so in any *Deer*. The *Thar* gland seems to me connected with the generative organs: and I take its profuse secretion to be a means of relieving the animal (when it has no mate particularly) from the extraordinary excitement to which it is liable in the courting-season. I have witnessed that excitement, and have been amazed at its fearful extent, topical and general, for six weeks and more.

"The *Chiru's* labial sacs, or intermaxillary pouches, are, most clearly, accessory nostrils, designed to assist breathing at speed. They spread with the dilatation of the true nostril, and contract with its contraction. This species has but five molar teeth on each side of either jaw." B. H. H.—*Philosophical Magazine, No.* 54, *October* 1836.

A paper by B. H. Hodgson, Esq., Corr. Memb. Z. S., on some of the *Scolopacidæ* of Nipâl, was read; the copy transmitted by that gentleman to the Society containing various corrections of his memoir which was published at Calcutta in the 'Gleanings of Science' for August, 1831.

Mr. Hodgson's object in the present paper is to bring under the notice of zoologists the various species of the family referred to which occur in Nipâl, on the natural history of which country he has, during a residence of several years, been engaged in making most extensive researches. The result of these it is his intention immediately to publish, accompanied by finished representations of the animals, taken from drawings made in almost every instance from numerous living individuals of the several races.*

Mr. Hodgson first describes in detail the *common Woodcock, Scolopax Rusticola,* Linn., as it occurs in Nipâl; where it is, in every respect of form and colour, evidently identical with the European bird. In Nipâl also it seems to be, as it is in Western Europe, of migratory habits: and the periods of its arrival in, and departure from, Nipâl, correspond altogether with the seasons of its appearance and disappearance in England.

He then proceeds to describe in detail the several kinds of *Snipe* which occur in Nipâl.

Two of these are so nearly related to the *common Snipe* of Europe, *Gallinago media,* Ray, that Mr. Hodgson is induced to regard them as being probably specifically identical with that bird: and he accordingly refers them to it as varieties, which are constantly distinguished from each other by the structure of the tail. In one of them the tail-feathers are fourteen or sixteen in number, and are all of the same form: in the other the tail-feathers vary in number from twenty-two to twenty-eight; and the outer ones on either side, to the number of six, eight, or ten, differ remarkably from those of the middle, being narrow, hard, and acuminated. The latter bird may, however, be regarded as the representative of a species to which the name of *Gall. heterura* may be given.

The other two *Snipes* of Nipâl are unquestionably distinct from those of Europe. They are described as the *solitary Snipe, Gall. solitaria,* Hodgs., and the *Wood Snipe, Gall. nemoricola,* Ej.

In the *solitary Snipe* the wings are remarkably long; the upper surface, especially on the wings, is minutely dotted, barred, and streaked, with white intermingled with buff and brown; and the *abdomen* is white, barred along the flanks with brown.

The *Wood Snipe* has the general colouring of the plumage dark and sombre; the wings short; the *abdomen* and the whole of the under surface thickly barred with transverse lines of dark brown, on a dusky white ground; and a tail of sixteen or eighteen, or very rarely twenty feathers.

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* We learn from Mr. Hodgson, and from the *Journal of the Asiatic Society of Bengal*, that many of the drawings to serve as illustrations to the projected work, have been sent to Europe from Calcutta, to be put into the hands of Artists there. These drawings were exhibited at the scientific *soirees* of Lord AUCKLAND, and excited general admiration. The Editor of the Bengal Journal designates them as a "magnificent series of illustrations." The indefatigable industry, great talents, and extraordinary tact in the observation of the natural forms and habits of animals, possessed by Mr. Hodgson, render it quite certain that this work will far surpass any that have yet appeared on Indian Zoology. We cannot too much admire the conduct of this high civil functionary, in thus devoting the time which he can spare from the official duties of his exalted station, to the prosecution of scientific labours of this kind. The Indian community, and the cultivators and admirers of science, should testify their appreciation of such exertions, by subscribing to the work, so as to prevent the chance of any pecuniary loss to the disinterested author in the prosecution of his costly undertaking.—*Editor Madras Journal.*

Mr. Hodgson describes, with the greatest minuteness, each of these birds, and adverts with the fullest detail to their several habits and distinguishing peculiarities, as well of manners and of seasons as of form and plumage.—*Ibid*, No. 52.

Proceedings of the Royal Astronomical Society of London.—Sir J. Herschel states, that he has nearly gone over the whole south circumpolar region, to 60° from the pole; the observations of which are in the course of arrangement. He is somewhat surprised at the extraordinary paucity of *close double* stars, which cannot arise from want of power in the telescope, or from the nature of the climate: for he considers his mirrors as perfect as it is possible to make them; and he represents the beauty and tranquility of the climate to be such, that the stars are reduced to all but mathematical points, and thus allow of their being viewed like objects under a microscope. But although the number of double stars is so small, considering the richness of the southern heavens in stars, yet he represents the *nebulæ* as very copious; and has accordingly collected a numerous list, which will doubtless, in due time, be laid before the public.

Extract of a Letter from Captain Smyth to the President, containing the translation of a notice from M. Cacciatore:

" One important thing I must communicate to you. In the month of May I was observing the stars that have proper motion; a labour that has employed me several years. Near the 17th star, 12th hour, of Piazzi's Catalogue, I saw another, also of the 7-8th magnitude, and noted the approximate distance between them. The weather not having permitted me to observe on the two following nights, it was not till the third night that I saw it again, when it had advanced a good deal, having gone further to the eastward and towards the equator. But clouds obliged me to trust to the following night. Then, up to the end of May, the weather was horrible; it seemed in Palermo as if winter had returned: heavy rains and impetuous winds succeeded each other, so as to leave no opportunity of attempting anything. When at last the weather permitted observations at the end of a fortnight, the star was already in the evening twilight, and all my attempts to recover it were fruitless: stars of that magnitude being no longer visible. Meanwhile the estimated movement, in three days, was 10″ in AR, and about a minute, or rather less, towards the north. So slow a motion would make me suspect the situation to be beyond *Uranus*. I was exceedingly grieved at not being able to follow up so important an examination."—*Ibid.*

On the discovery of the Tea Plant in a Province of British India.

(Extract from an Article by M. Alphonse De Candolle in the *Bibliotheque Universelle* of Geneva).

A Committee, established at Calcutta for the culture of Tea, has been employed in seeking, in the vast extent of the Anglo-Indian territory, the best locality for cultivating the precious shrub of China. To this end the Committee directed its attention to the Province of Assam on the borders of the Chinese Empire, and required from the European Officers stationed there information on the nature of the country. In reply, Captain Jenkins, in a letter, dated 7th January 1834, states that the mountainous region situated between Cachar and Assam, must be extremely favourable to the culture of Tea, as there are found there numerous species of *Camellia*, a genus much resembling the Tea, and that, in the district of Beesa, "a coarse variety of the tea plant is indigenous."

Notwithstanding, the celebrated Dr. Wallich, Superintendent of the Botanic Garden of Calcutta, appears to have doubted this assertion, emanating from an officer who is no botanist. He knew how much the leaf of the Tea plant resembles that of certain Camellias which grow in the mountains to the north of India, and he deferred a decision until he had seen specimens. Captain Jenkins was not slow in forwarding them. After an examination which he was then enabled to make of the leaf and fruit of the Assam tea, Dr. Wallich entertained no further doubt. It is indeed the Tea of China which grows in this part of the English territory, as the figure and brief notice of Dr. Wallich,* which we have before us, plainly testify. It remains to know whether this wild tea possesses the perfume of that cultivated in China, and whether the province of Assam offers favourable conditions for the culture of Tea, and for the delicate preparation of the leaves.

Captain Jenkins, having communicated the circular of the Calcutta Committee to Lieutenant Charlton, established in the province of Upper Assam, speedily procured accounts full of interest. Lieutenant Charlton was already aware of the existence of tea in Assam. He had even despatched living plants of it to the Calcutta Garden three years before, which he understood to have decayed. It was from the hills of Beesa that they were obtained. Many plants attain the height of 12 or 14 feet. He describes them from memory, in a letter to Captain Jenkins, and declares that he has no doubt of its being a species of tea. "I have not had an opportunity" says he "of making any experiment on the leaves; they are described as small in their green state, but acquire the fragance and flavour of Chinese tea when dried. The Singphos and Kamtees are in the habit of drinking an infusion of the leaves, which I have lately understood they prepare by cutting them into small pieces, taking out the stalks and fibres, boiling and then squeezing them into a ball, which they dry in the sun and retain for use."

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* Journal of the Asiatic Society of Bengal, Jan. 1835,

This coarse mode of preparing tea is not unfrequent in the countries which surround China. It is said that the Tartars harden it with a kind of argillaceous earth, which they convey about in the shape of cakes, and that they eat it in that form, or drink it in infusion. We can testify from experience that it is a detestable beverage; but the palate of these barbarians is more gratified by the pungent flavour of the leaf, than by the delicious aroma, which exhales when it is carefully selected and well prepared. The same kind of men, among ourselves, prefer gross brandy to the evanescent fragrance of choice wine.

The Burmans use the tea in all fashions—As their country borders the province of Assam towards the north, and their capital, Ava, is distant only a hundred leagues, it may be useful to cite a passage from Crawford's Journey, concerning the indigenous tea of those regions.[*]

"Tea is cultivated on the hills by some of the mountain races, but it does not exist nearer Ava than five days' journey, and we consequently saw none of it growing. The best is grown by the race called D'hanu, whose country lies to the north-east of Ava, distant about ten days' journey. The leaves are elliptic, oblong, and serrated like the Chinese plant; and the Burmese, not following the practice of other nations, designate the latter by the native name of their own plant, Lap'het. There is little doubt, therefore, but that it is a genuine *Thea*, and most probably a native of the country. The Burmese eat the leaf prepared with oil and garlic, and never use the infusion as they do that of Chinese tea, which they call Lap'het-re, or tea-water." The author mentions elsewhere the frequent importation of China tea to Ava by the route of internal commerce.

The difference which the Burmans make between these two teas, valuing the infusion of the China leaf, makes me fear that the wild plant, which grows to the north of their country and in the province contiguous to Assam, yields tea of but an inferior quality. I do not mean to say that it is of a different species from the true tea, in the botanical sense of the word species; but it may be a less fragrant variety. We know already that, in the interior of China itself, the selling price of tea varies much in different places. It is with the tea plant as with the vine, which yields very different products in places near to each other; which should not surprise us, for, besides the diversities of soil and situation, there are many differences in the period of gathering the leaves, in the number of crops, in the preparation of the leaves, and perhaps also in the kinds or varieties which have been cultivated from time immemorial in each locality. The wild tea may very likely afford a stronger and more pungent flavour, and a less delicate perfume.

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[*] Journal of an Embassy to the Court of Ava, by J. Crawford, Esq.

[†] In fact, Dr. Wallich, naturalist of the expedition, did not find it in the Burmese country. There is not a trace of it in the herbarium of that country, which he has confided to us, nor in the manuscript of his voyage.

This consideration, however, does not diminish, in our eyes, the interest of the English discovery. If the province of Assam which touches China, affords the tea plant spontaneously, it must be eminently fit for the culture of the plant. Supposing that the wild plant may prove of little use, the cultivated plant, especially that which may be brought from China, may prove of great advantage.

The Calcutta Committee has well determined. It has despatched Dr. Wallich to Assam. It is not the first mission of the kind of that zealous naturalist. He was sent, in 1827, to the province of Martaban, to explore the forests of teak wood. He has in like manner visited other regions of the vast empire of the British, to report on their natural resources, and he has always acquitted himself in these missions, with the ardour and talent which characterize him.

We are able to say nothing more of the results of the expedition to Assam, which is still going on.* †

Extract of a letter from Dr. Wallich, Superintendent of the Botanic Garden of Calcutta, to M. Benjamin Delessert, dated 10th August 1835.

"I purpose to start in four days, first for the mountains neighbouring Sylhet, particularly Churra-Poonje, and Myrung, where I remain until October. Traversing then the mountains of Khasiya, I proceed straight to Gowahutty in Assam, and thence to Suddiya in Upper Assam on the Burrampooter, where I shall commence my investigations for the report on Tea. I shall be accompanied by a medical gentleman whose name is well known to you, as well as to M.M. Mirbel and Brongniart, Mr. William Griffith, a young man deeply acquainted with general and physiological botany, who cannot fail to acquire great celebrity. Another gentleman of the East India Company's Medical Service, will accompany me as geologist; this is Mr. John M. Clelland, who is publishing here at this moment a work on the geology of Kemaon. I am proud to say, that it was at my recommendation that these gentlemen are attached to the mission.

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* Subjoined to the above we publish an extract from a letter from Dr. Wallich, which gives some details of the early results of the journey.—*Editor* Annales.

† The particulars of this interesting expedition, so important to Commerce as well as to Science, remain to this time unknown to the public. From the talents of the gentlemen of the deputation there is no doubt but that the Reports to Government have been most ample and satisfactory, and would prove highly interesting. Incidentally something has been made known by Mr. Griffiths, through our pagesand those of the Bengal Journal, on the botany of Assam; but nothing like a narrative of the expedition has yet been promulgated.—*Editor Madras Journal.*

"We hope to be on our return in the month of April next year, by which time the principal end of our journey will, I think, be accomplished in a satisfactory manner. This end is to make every possible research as to the locality of the true tea (wild and spontaneous) in Upper Assam. It is unnecessary to say that I calculate on making with Mr. Griffith an extensive collection of plants, and I need not add that I hope to send you specimens. I shall send the whole to the East India Company, but I shall take care expressly to request that you may have the duplicates, and I know too well the munificence of the Directors to doubt that my desire will be attended to. The government has been very liberal in the dispositions made for our mission to Assam, as well regarding me as my assistants. I take with me many draughtsmen and gardiners, and if I am able to exert the same ardour and energy as in my early expeditions, I believe we shall obtain good results. But I assure you that twenty-eight years' sojourn in India have enfeebled my mind and body; so that the best assurance of success lies in the incalculable advantage of being assisted by such excellent companions."*

Abstract of a Report on the Climate and Diseases of Van Dieman's Land, by W. Milligan, Esq. M. D., *Assistant Surgeon, H. M.* 63d *Regiment.*—The new colony of Western Australia, according to Dr. Milligan, is situated on the Western Coast of New Holland, and extends from Cape Londonderry, in latitude 13° 44′ South, to West Cape Horne, in latitude 33° 8′, and from longitude 112° 52′ to 129° from the meridian of Greenwich. The Swan River district, the one first settled, and still the most important, is situated in between latitude 32° and 33°; the entire area being about 50 miles long by 30 in breadth. The country is generally of the open forest description, the surface undulating, and covered with a great profusion of trees, shrubs, and herbaceous plants. Three rivers intersect this valley, the Swan, the Canning, and the Murray. They are subject to the influence of the tides, abound with fish, and, though generally shallow, are subject to occasional inundations, which leave extensive alluvial deposits. The Swan is navigable for boats of four or five tons as high up as Perth, which is about 12 miles from the Sea Coast. Fresh water lagoons are numerous; there are also others containing salt-water. The water of the wells, though at first indifferent, from not having been procured from a sufficient depth, is excellent. It sparkles in the glass, cooks food, and washes linen well and speedily, and may be drank freely without relaxing the stomach. The strongest winds are from the north-west and south-west. The north wind is the hottest, and is very sultry during summer, destroying vegetation if long continued. During the summer, there is a regular land and sea breeze, the former prevailing in the morning from the east, and the latter setting in about noon from south-west. The mornings and evenings are pleasant, and the nights cool. The sky is clear, and of a beautiful azure without cloud or rain: moderate dews descend at night. As the autumn approaches, the weather becomes less serene. The sky is occasionally overcast, with thunder-storms, which prove acceptable, however, and beneficial, mitigating the excessive heat, and rendering the fields fit for the labours of the husbandman. In winter, the winds are occasionally boisterous, endangering the shipping if exposed; it rains for the most part two or three days together, and then clears up for a somewhat longer period. In wet weather, fogs are not uncommon in the mornings and evenings in the low grounds, or along the banks of the rivers. Hail of a large size occasionally falls; snow is unknown, and ice is but rarely met with. Fires are not unwelcome in the mornings and evenings; but on the whole are to be looked on more as a luxury than a necessary. Such is the nature of the climate and locality to which Sir James Stirling proceeded in June 1829, accompanied by a detachment of His Majesty's 63d Regiment, to establish a new colony. Settlers soon commenced to arrive, and poured in rapidly, till the end of 1830, at which time, the population amounted to about two thousand. The vessels which brought them out, resembled in some measure Noah's ark, being crowded to excess with animals, birds, and plants, as well as men, women, and children, with provisions and household goods. If we can fancy the population of one of the parishes in England, mixed with a sprinkling of half pay officers, some gentlemen from the East and West Indies, and a few Cocknies, put down on the shores of a wilderness, we shall have some idea of the founders of this interesting colony. Their first object on landing was to get under shelter. Their domiciles were of course at first of a wretched description. Some had single tents; others huts of green-wood, pervious to every shower; while many had no other covering night or day than the wide canopy of heaven. Afterwards, when the settlers got on their own grants of land, their houses improved, by successive gradations, from the wooden house they had imported, or had made in the colony, to that of wattle and dub, and finally to the more durable structure of brick or stone. As might be expected, losses from the straying of cattle in the bush, and disagreeable adventures from the travellers losing their way, were far from uncommon; accidents from explosions of gun-powder, and from the use of fire-arms by persons unaccustomed to handle them, were likewise far from unfrequent; in no instance however did any tetanic affection follow. Notwithstanding these little mishaps, matters continued to go on pleasantly enough till the beginning of the winter of 1830, when the supplies brought from England, consisting principally of salt meat, biscuit, and rum, began to fail; the harvest was indifferent; and to crown their misfortunes, after heavy rain, the rivers rose from fifteen to twenty feet above their usual level, and all who had commenced buildings on the lower grounds were obliged to desert them. From these various causes much personal fatigue and exposure were encountered, the hopes of the settlers damped, and their energies depressed; scurvy, fever, and dysentery consequently showed themselves. These diseases were principally confined to the lower orders; among the higher classes, who were better provided with the necessaries and comforts of life, and who were more temperate in their habits, there was little sickness and less mortality. With successive seasons, the harvest became more bountiful, the flocks more numerous, and scurvy has disappeared in consequence. The fevers have likewise become less prevalent, as the country has been more widely cleared and better drained. The Endemic diseases of the country appear to be principally inflammatory affections of the mucous membranes, Ophthalmia, Dysentery and Catarrh. Rheumatism is occasionally met with, in damp weather, in autumn and winter, of rather an obstinate description; and also a low fever, the *Gastro-Enterite*. Dr. Milligan's observations on these diseases have principally reference to the locality of Perth, the capital of the colony. This town is situated on the banks of the Swan river, on a gentle elevation, 30 feet above the level of the river, and about 40 above that of the sea. It is bounded to the south by the Swan, which is here three quarters of a mile broad; to the north by a string of fresh water Lagoons, which run up to the mountains; to the east by an extensive plain terminated, by the Darling range; and to the west by Mount Eliza, which running north and south, affords considerable protection from the strong gales coming in that direction. The Swan and the Canning unite immediately below the town in a large estuary, called Melville water, which still farther reduces the temperature of the sea-breeze in its progress inland. The soil is light and sandy, with the exception of the banks of the river, which are alluvial. The substratum is sandstone.

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* Translated from the *Annales des Sciences Naturelles*, Fevrier, 1836.—*Editor Madras Journal.*

The climate agrees with the European constitution; and every description of live stock, and of vegetable production, though collected from different climates, finds there a congenial locality. The annual mean temperature is from 60° to 64°. A great advantage, which the Swan River possesses to the Indian invalid, is its proximity, the voyage from Madras having several times been performed in 25 or 30 days; it is said to be shorter by one half, than either to Sydney or Van Dieman's Land. The society is good and respectable. The best period for leaving India is February, as the intensity of the summer heat in both countries is thus avoided.

Among much other valuable information in Dr. Milligan's elaborate paper, is an interesting account of the Aborigines of the country.*—*Transactions of the Medical and Physical Society of Calcutta*, Vol. VIII. p. VI. Appendix.

Description of a Post Mortem Examination of a Tiger—By Dr. Benza, Surgeon to the Right Honourable the Governor of Madras.—The subject of the case was a full-grown male, which died in the Government Park at Madras. This animal for some days before his death had refused his food, and appeared very ill; his breathing was deep and quick, he was hot and feverish, and his belly tense and painful. In this state he remained for several days, never attempting to change his position. The body was examined twelve hours after death. The abdomen contained about five pints of very offensive thin yellow fluid. The abdominal and visceral peritoneum were highly inflamed. The ilium for about three inches of its lower third was swollen, and converted into a hard tumour, having six perforations through its coats; the widest (more than three lines in diameter), was closed by a portion of bone, and sharp pointed spiculæ were seen projecting through the other foramina: the colon and ilium were much contracted. Within the swollen part of intestine were many loose pieces of bone, and a round ball formed of several angular bits of bone, agglutinated and bound together by a kind of net-work of hair and wool. This ball adhered slightly to the intestines by means of an adventitious tissue, which was highly injected. Dr. Benza remarks on the singular anomaly of finding undigested bones so low down in the intestine of an animal possessed of such digestive power as the tiger, and accounts for it by supposing, that these pieces of bone became entangled in the stomach with the wool and hair of the sheep, which formed the ordinary food of the animal; these latter substances being more indigestible than the bones, covering them with a sort of felt coat protected them from the action of the gastric juice, and thus the whole ball passed down unchanged into the intestines. At length this ball being deprived of the greater portion of its woolly covering, the spiculæ became exposed, and protruded against the intestine, greatly irritating it, thereby causing a thickening and constriction, by which the pieces of bone were held in one position, until they produced ulceration. Dr. Benza's account was accompanied by a preparation of the perforated intestine.—*Ibid*, p. xxiii.

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* The paper of Dr. Milligan, which, from the brief abstract given by the Medical and Physical Society, (of which the above is a fragment), promises to afford great interest in its entire shape, must have contained much matter irrelevant to the medical pages of the Transactions, which accounts for its not having been introduced wholly. The author has promised to make over the manuscript to us when he recovers it from Calcutta; when that portion which treats of climatology, and of the Aborigines of the country, will no doubt be found suited to our pages. Australia is an interesting country, demanding enquiry and observation from all, but we have an additional motive here, from the circumstance of its being so frequently the resort of Indian invalids. Though it may seem, therefore, that we are, geographically, travelling somewhat out of our way, to introduce accounts of this country into the Journal of an *Asiatic Society*; yet we may do so with perfect propriety, as it is within our bounds politically (being to the eastward of the Cape), and, moreover, has numerous affinities to the Islands of the Eastern Archipelago, and these, again, to the continent of India, the relations of which, to Australia and to each other, it is important for the philologer and the naturalist to enquire into.—*Editor Madras Journal.*

Fall of part of Dent du Midi.—M. Elie de Beaumont read to the Geological Society of France a communication from M. Lardy upon the fall of a part of the *Dent du Midi*, one of the high Alps. This fall took place on the 26th of August 1835. M. Lardy states, that on Tuesday the 25th of August there was a violent storm in the evening all round the Dent du Midi; and it was asserted that its peak was then struck by the thunderbolt. Next day, the 26th, between ten and eleven o'clock in the morning, a very considerable portion of this peak suddenly broke off from its eastern edge, and precipitated itself with a dreadful crash upon the glacier which is situated upon the southern side of the *Dent*, and in its descent drew along with it an immense proportion of this glacier. This enormous mass of stone and ice fell into the deep ravine which separates the *Dent du Midi* from the *Col de Salenfe*, into which the torrent of St. Barthelemy runs. Speedily there issued from this gorge, through which this torrent flows to the valley of the Rhone, as it were, a mountain of black and viscid mire, on the surface of which there floated vast masses of rock of all dimensions, some of them as much as twelve feet high. This liquid mass, like a flow of lava, directed itself towards the Rhone, across the forest of pines which covers this part of the valley, drawing along with it every thing it met in its way. Trees of the largest size were overturned, and crushed like reeds. On reaching the bank of the river, it precipitated itself into it, thus forming an expanse of mud, which was fearful to behold. The fragments of rock contained in the mud were also impelled into the Rhone, whose waters were thrown to the opposite bank, and forced to re-ascend their channel to a considerable distance. The great road covered by this mire and these stones became impracticable, and it was necessary to construct, by means of fagots, &c. a new road on this elastic soil. For many days the communications between the high and low Valais were effected by means of a bridge which was far from being stable, thrown across the torrent at the commencement of the gorge. It is impossible to conceive any thing more frightful than this ravine of from sixty to a hundred feet deep, with a breadth of from two to three hundred feet, and which augments in size as far as the Rhone, choked up with this really frozen mire, with its surface studded with great blocks of stone, and the trunks of trees. A small portion only of the peak fell to the northern side of the *Dent du Midi*, which, descending by a slope, covered a part of a glacier which is on that side. After reading this notice from M. Lardy, M. Elie de Beaumont gave some additional details regarding the phenomena, a part of which he had witnessed. He particularly insisted on what appeared especially curious as to the mode in which the muddy currents, produced by the fall, spread themselves over the great cone of debris of the torrent of St. Barthelemy, and which is at an inclination of from five to seven degrees. These torrents of mud did not contain perhaps a tenth part of water, and yet they displaced blocks of limestone several yards long, and even floated them on their surface for considerable distances, almost as easily as a river floats ice. Notwithstanding its comparatively small dimensions, this phenomenon appeared to M. Elie de Beaumont to possess a peculiar interest, as leading to conclusions respecting the mode by which the transport of diluvian blocks or boulders is effected. M. Huot, who was also an eye-witness of a part of this phenomenon, added some facts to the communication. The nature of the soil, which was composed of calcarious schist and of a black marl, must have necessarily facilitated the eboulement. A cloud of dust rose to a great height for many days after the event, which, from a distance, had all the appearance of a volcanic eruption. It was remarked, that a person might walk upon the fluid mass almost at the same instant as it was extending itself in all dimensions. At the extremity of the valley, a deep valley of erosion was hollowed out in the Taswey.—*Edinburgh New Philosophical Journal for July—October* 1836.

Trade in Chromate of Iron.—Many years ago chromate of iron was discovered by Professor Jameson in the serpentine rocks of the Shetlands, and afterwards on the mainland of Scotland. This observation was in 1820 mentioned in one of the editions of his System of Mineralogy. Afterwards, his pupil, the now well known and distinguished geologist, Dr. Hibbert, found chrome-ore in such quantities in the Shetland groups, that the quarries of it opened after his visit have realized a very considerable return to the proprietors. It is exported from the Shetlands as a raw material. Since the year 1826 this ore of iron has become in Norway, where it was discovered by the celebrated geologist Esmark, an article of trade. It was, until the year 1831, exported in the rough state, and with but comparatively little profit to the proprietors of the ground, to Altona, Hamburgh, Petersburg, England, and Holland. In the year 1830 not less than 1133 ship-pounds were sent to Havre de Grace alone. It being considered more profitable to export the prepared chrome in place of the crude ore, a company has been got up at Drontheim for this purpose, which purposes to supply the cotton printers in Britain, France, and Germany, and also the porcelain manufactories, with prepared chrome.*—*Ibid.*

Delightful Smell on approaching tropical lands from sea.—The coast of Chili, says Poeppig, "appeared nearly to resemble the desolate region of Terra del Fuego." Even the peculiar smell was wanting which is usually perceived on approaching the coasts of countries between the tropics, and of which even animals are so sensible that they become restless, appearing to have a presentiment of the termination of their long confinement, and often boldly leap overboard to reach the shore, which they suppose to be close at hand. On this passage Poeppig says in a note,—"Whoever has made a voyage to the tropical countries of South America, or the West Indies, will always remember with pleasure the sensation which he experienced on approaching the land. Perhaps no sense is then so strongly affected as the smell, especially if you approach the coast in the early hours of a fine summer's morning. On the coasts of Cuba, the first land I saw in America, on the 30th of June 1822, all on board were struck with the very strong smell, like that of violets, which, as the day grew more warm, either ceased, or was lost amidst a variety of others, which were perceptible as we drew nearer the coast. During a long stay in the interior of this island, I became acquainted with the plant which emits such an intense perfume as to be perceived at the distance of two or three miles. It is of the species *Tetracera*, and remarkable for bearing leaves so hard that they are used by the native cabinet-makers, and other mechanics, for various kinds of work. It is a climbing plant, which reaches the tops of the loftiest trees of the forest, then spreads far around, and in the rainy seasons is covered with innumerable bunches of sweet-smelling flowers, which, however, dispense their perfume during the night only, and are almost without scent in the daytime."—*Ibid.*

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* Why should Norway supply chrome to the *British* cotton printers and porcelain manufacturers, when *British* India produces abundance for the consumption of the mother country ? The district of Salem, would supply all Europe, we suppose, with the ore, and the various beautiful dyes produced therefrom.—*Editor Madras Journal.*

BRITISH ASSOCIATION FOR THE ADVANCEMENNT OF SCIENCE.

Sixth Meeting.

The sixth meeting of this Association, held at Bristol, has been highly satisfactory in every respect, both as regards the number and the eminence of the men of science who attended, the quantity and value of the communications, and the zeal and cordiality which were manifested. A general outline of the proceedings has been given in the daily and weekly papers : we shall, we conceive, best promote the interest of science by reserving our pages as last year for authentic and official details. We may, however, just notice the subjects of two of the communications, on account of the lively interest which they excited.*

On the change in the chemical character of Minerals induced by Galvanism.—By R. W. Fox.

Mr. Fox mentioned the fact, long known to miners, of metalliferous veins intersecting different rocks containing ore in some of these rocks, and being nearly barren or entirely so in others. This circumstance suggested the idea of some definite cause ; and his experiments on the electrical magnetic condition of metalliferous veins, and also on the electric conditions of various ores to each other, seemed to have supplied an answer, in as much as it was thus proved that electro-magnetism was in a state of great activity under the earth's-surface ; and that it was independent of mere local action between the plates of copper and the ore with which they were in contact, was shown by the occasional substitution of plates of zinc for those of copper producing no change in the direction of the voltaic currents. He also referred to other experiments, in which two different varieties of copper ore, with water taken from the same mine, as the only exciting fluid, produced considerable voltaic action. The various kinds of saline matter which he had detected in water taken from different mines, and from different parts of the same mine, seemed to indicate another probable source of electricity; for, can it *now* be doubted, that rocks impregnated with a holding in their minute fissures different kinds of mineral waters, must be in different electrical conditions or relations to each other? A general conclusion is, that in these fissures metalliferous deposits will be determined according to their relative electrical conditions; and that the direction of those deposits must have been influenced by the direction of the magnetic meridian. Thus we find the metallic deposits in most parts of the world having a general tendency to an E. and W. or a N.E. and S. W. bearing. Mr. Fox added, that it was a curious fact, that on submitting the muriate of tin in solution to voltaic action, to the negative pole of the battery, and another to the positive, a portion of the tin was determined like the copper, the former in a metallic state, and the latter in that of an oxide, showing a remarkable analogy to the relative position of tin and copper ore with respect to each other as they are found in the mineral veins.

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* Influenced by the same feelings which actuate the Editor of the *Philosophical Magazine*, we have abstained from alluding to the Proceedings of the Association, further than to give the above extracts. When the authentic reports reach us, we shall give such an account of the volume, in successive numbers of this Journal, as will afford our readers a view of the present state of Science, in its various branches. By thus treating the annual publication of the Association, we shall be enabled to keep pace with the advance of knowledge, and to impart to our readers, not our own feeble ideas, but the statements of those leviathans of science, who have been selected by a congress of all the learned men of the British Isles, to report on the present state and prospects of Science, and the desiderata to which the attention of its cultivators should be directed.—*Editor Madras Journal.*

The Chairman (Dr. Buckland) said, it had been observed to them last evening, that the tests of some of the highest truths which philosophy had brought to light was their simplicity. He held in his hand a blacking-pot, which Mr. Fox had bought yesterday for a penny, a little water, clay, zinc, and copper; by which humble means he had imitated one of the most secret and wonderful processes of nature, her mode of making metallic veins. It was with peculiar satisfaction he contemplated the valuable results of this meeting of the Association. There was also a gentleman now at his right hand, whose name he had never heard till yesterday, a man unconnected with any Society, but possessing the true spirit of a philosopher; this gentleman had actually made no less than 24 minerals, and even crystalline quartz. He (Dr. B.) knew not *how* he had made them, but he pronounced them *to* be discoveries of the highest order: they were not made with a blacking-pot and clay, like Mr. Fox's, but the apparatus was equally humble; a bucket of water and a brickbat had sufficed to produce the wonderful effects which he would detail to them.

Artificial Crystals and Minerals.—A. Crosse, Esq., of Broomfield, Somerset, then came forward, and stated that he came to Bristol to be a listener only, and with no idea that he should be called upon to address a Section. He was no geologist, and but little of a mineralogist; he had however devoted much of his time to electricity, and he had latterly been occupied in improvements in the voltaic power, employing a battery which he had succeeded in keeping in full force for twelve months by water alone, rejecting acids entirely. Mr. C. then proceeded to state that he had obtained water from a finely crystallized cave at Holway, and by the action of the voltaic battery had succeeded in producing from that water in the course of ten days numerous rhomboidal rystals, resembling those of the cave: in order to ascertain whether ight had any influence in the process, he tried it again in a dark cellar, nd produced similar crystals in six days, with one fourth of the voltaic ower. He had repeated the experiments a hundred times, and always ith the same results. He was fully convinced that it was possible to ake even diamonds, and that at no distant period every kind of mineal would be formed by the ingenuity of man. By a variation of his xperiments he had obtained green and blue carbonate of copper, hospate of soda, and 20 or 30 other specimens.

Mr. Crosse having also observed in a cavern in the Quantock Hills ear his residence that the part of it which consisted of slate was udded with crystals of arragonite, while the limestone part was overed with crystals of ordinary carbonate of lime or calcarious par, subjected portions of each of these substances in water to long-ontinued galvanic action, and obtained from the—

Slate	Limestone
Crystals of Arragonite.	Calcarious Spar.

It was mentioned to the Section on the following day, that although o doubt could be entertained of the independence and originality of Mr. Crosse's experiments, yet that he had been anticipated, in the rtificial production of many of the crystallized bodies which he had ormed, by M. Becquerel, and some other French chemists.—*Phil. Mag. No.* 53, *Sept*, 1836—p. 228, 230.

The following is a statement of the new and renewed Grants of Money for the advancement of particular branches of science, which have been made by the Association at this Meeting.

Mathematical and Physical Science.

250*l.*	For the discussion of Observations of the Tides; at the disposal of J. W. Lubbock, Esq.
150*l.*	For the discussion of Observations of the Tides in the port of Bristol; at the disposal of the Rev. W. Whewell.
70*l.*	For the Deduction of the Constant of Lunar Nutation; under direction of Sir T. Brisbane, Mr. Baily, and Rev. Dr. Robinson.
30*l.*	For Hourly Observations of the Barometer and Wet-bulb Hygrometer; at the disposal of W. S. Harris, Esq.
100*l.*	Renewed grant for the establishment of Meteorological Observations and Experiments on Subterranean Temperature; at the disposal of a Committee, consisting of Prof. Forbes, W. S. Har-

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ris, Esq., Prof. Powell, Col. Sykes, and Prof. Phillips, who will act as Secretary.

500*l.* Enlarged grant for the procurement of accurate Data to determine the question of the Permanence or Variability of the Relative Level of Land and Sea. The Committee consists of Mr. Baily, Mr. De la Beche, Col. Colby, Mr. Cubitt, Mr. Greenough, Mr. Griffith, Mr. Lubbock, Capt. Portlock, Mr. G. Rennie, Rev. Dr. Robinson, Prof. Sedgwick, Mr. Stevenson, and Rev. Wm. Whewell, who will act as Secretary.

100*l.* For Experimental Investigations on the Form of Waves; at the disposal of John Robison, Esq., and J. S. Russell, Esq.

500*l.* Renewed grant for the Reduction of Observations in the *Hist. Céleste* and in the volumes of the *Académie des Sciences* for 1789 and 1790; under the direction of the Astronomer Royal, F. Baily, Esq., J. W. Lubbock, Esq., and Rev. Dr. Robinson.

150*l.* For Experiments on Vitrification; under the direction of Dr. Faraday, Rev. W. V. Harcourt, and Dr. Turner.

80*l.* Renewed grant for the construction of a rock-salt Lens; under the direction of Sir D. Brewster.

Chemical and Mineralogical Science.

50*l.* Renewed grant for Researches on the Specific Gravity of Gases; under the direction of Dr. Dalton and Dr. C. Henry.

30*l.* For Researches on the Quantities of Heat developed in Combustion and other chemical Combinations; at the disposal of Dr. Turner.

15*l.* For Researches on the Composition of Atmospheric Air; at the disposal of Dr. Dalton, and Mr. W. West.

24*l.* 13*l.* For the publication of Tables of Chemical Constants drawn up by Prof. Johnston.

60*l.* For Researches on the Strength of Iron made with hot and cold blast; at the disposal of Messrs. Fairburn and Hodgkinson.

Geology and Geography.

20*l.* Renewed grant for Experiments on the Quantity of Mud suspended in the water of Rivers; under the direction of Mr. De la Beche, Mr. G. Rennie, and Rev. J. Yates.

30*l.* For special Researches on Subterranean Temperature and Electricity; at the disposal of Mr. R. W. Fox.

50*l.* For Researches into the Nature and Origin of Peat Mosses in Ireland; under the direction of Col. Colby.

Botany.

25*l.* For experimental Researches on the Growth of Plants, under glass and excluded from air, according to the plan of Mr. Ward; under the direction of Dr. Dalton, Dr. Daubeny, Rev. James Yates, and Prof. Henslow, who will act as Secretary.

Medical Science.

50*l.* Renewed grant to the Committees appointed to investigate the subject of the Anatomical Relations of the Absorbents and Veins.
50*l.* Renewed grant to the Committees appointed to investigate the Motions and Sounds of the Heart.
25*l.* For Researches into the Chemical Composition of Secreting Organs; under the direction of Dr. Hodgkin, Dr. Roget, Dr. G. O. Rees, and Dr. Turner.
25*l.* For Investigations on the Physiological Influence of Cold on Man and Animals in the Arctic Regions; at the disposal of Mr. King.
25*l.* Renewed grant for the Investigation of the Effects of Poisons on the Animal Economy; under the direction of Dr. Roupell and Dr. Hodgkin.
25*l.* Renewed grant to the Committee formerly appointed to investigate the Pathology of the Brain and Nervous System. Of this Committee Dr. O'Beirne has been requested to act as Secretary.
25*l.* For Investigations on the Physiology of the Spinal Nerves; under the direction of Mr. S. D. Broughton, Mr. E. Cock, and Dr. Sharpey.

Statistics.

150*l.* For Inquiries into the actual State of Schools in England, considered merely as to numerical analysis; under the direction of Mr. Hallam, Mr. Porter, and Col. Sykes.

Mechanical Science.

50*l.* Renewed grant for an Analysis of the Reports of the Duty of Steam-Engines in Cornwall; under the direction of Mr. Cubitt, Mr. J. Rennie, and Mr. John Taylor.—*Phil. Mag. No.* 54, *Oct.* 1836—p. 312, 314.

POSTSCRIPT.

To the Editor of the Madras Journal of Literature and Science.

My Dear Sir—Since the publication of my remarks on the Gamboge tree, I have had much correspondence with Colonel Walker respecting it; in the course of which he recalled to my recollection a circumstance which, at the time of writing, had altogether escaped my memory, namely, that he had shown me specimens collected in the cinnamon gardens of Colombo, where he believes it indigenous. He has besides mentioned several other localities in which it is found in the interior, which leaves not the slightest doubt that it is truly a native of Ceylon. In one letter he says, "it is found in great abundance along the western and eastern coast in the neighbourhood of Battacola, but I am assured by natives who know the Kara goraka or Gokatu, that it grows to a very large size in the Seven Korles quite inland, where it could not have been planted by the Dutch. * * * The Gamboge itself is as fine as any in the world. Mrs. Walker has tried the juice of two or three species, none of which mix properly with water or spirit, or are at all fit for the purposes of colouring drawings. That of the tree in question is as good for medicinal purposes and painting as any from Siam or elsewhere, and the great probability is, that, being produced in nearly the same situations, they are identical." In another letter he says, "I think we have ascertained to a certainty that it is indigenous in Ceylon, for the largest trees are found in that part of the interior where the Dutch had no control; its favourite abode, however, seems to be, in low sandy ground, being very abundant about Kaderaane, Negombo, and towards Chilaw, also about Colombo, and not at all confined to gardens. Of all the Garcineæ which are in Ceylon, be assured that *Xanthochymus pictorius* alone is foreign. You may be equally certain that *Stalagmitis Cambogioides*, Moon's Cat., produces as fine Gamboge as any in the world, for what can be finer or more durable, than the colour on the figures of Buddhoo, painted centuries ago."

The last reference to this tree is in a note received two days ago, in which he remarks—"I have found the Stalagmitis, now described by Dr. Graham under a new name, one hundred miles inland, perfectly indigenous, and no other Garcineæ at so high an elevation, 2000 feet above the sea."

We have now irrefragable proof that the tree producing the best kind of Gamboge is a native of Ceylon. I have already proved, I think almost to demonstration, that Murray's *Stalagmitis Cambogioides* is identical with Roxburgh's *Xanthochymus Ovalifolius*, and that this new plant forms the type of a genus quite distinct from both Xanthochymus and Garcinia, for which I proposed to retain the now vacant name of Stalagmitis, combining with it *Garcinia pictoria*

Roxb. and *G. elliptica*, Wall. (fid. Graham), but which, it appears from Col. Walker's note, Dr. Graham has already published under a new name. It is now therefore certain that both Murray and Roxburgh were wrong in assigning the Pentadelphous flowered tree as the source of the true Gamboge of commerce, that Mr. Arnott and myself were equally in error in following them, and, finally, that the world is at last indebted to the industry and observation of Colonel and Mrs. Walker for making it acquainted with the characters of the long sought for genus of plants, which produces this most valuable pigment and medicine.

As a discovery so interesting cannot be too generally known, and as Colonel Walker has promised me a drawing from the accurate pencil of his accomplished lady, I trust you will be able to find room for it in a future number; I hope, accompanied by Dr. Graham's description and name. I remain, dear Sir, Yours, &c.

Madras, 15*th April* 1837. R. W.

Errata in my former communication.

Page 304, line 19, from the bottom, for glabose read globose.
— — — 8, — — — — putoria — pictoria.

Madras, 16*th April* 1837.

My Dear Sir—I yesterday received your note, with the specimens of plants from Goomsoor which accompanied, and was sorry to find them altogether unfit for preservation. Thinking it a subject of regret, that the labour of the few persons, who in this country seem willing to devote their leisure to making us better acquainted with its vegetable productions, should be rendered fruitless for want of a little skill, easily acquired, I have drawn up the following brief and simple instructions for preserving plants (which I hope you will be able to find room for in your forthcoming number) under the conviction, that many are deterred from attempting to form collections, by not knowing how to go about it. Should you think the style I have adopted too homely, pray bear in mind that I do not write for botanists, but for the uninitiated. The instructions are nearly those I give my native collectors, who traverse every part of the country collecting for me, and have made a very large collection indeed.

Yours very truly,
To R. Cole, Esq. &c. &c. &c. Robert Wight.

Directions for preserving Plants.—The first point to be attended to in forming collection of plants is the selection of suitable specimens. These, when both are procurable, ought always to present flowers and fruit, but when both cannot be had, invariably one of them, however imperfect, as it is impossible to make out an unknown plant from the leaves only. Flower buds will generally suffice, where full blown ones are not to be had, and immature fruit, where the full grown one is either too large, or so soft and pulpy that it cannot be preserved. The smaller herbaceous plants should have root and stem; but of trees or shrubs, branches, 12 or 18 inches long, are usually sufficient. Many herbaceous plants, too large, even when folded down, to be preserved entire, have the radicle and stem leaves of different shapes; in such cases, two or three of the radicle leaves and flowering branches will form perfect specimens.

For drying, lay one or more of these specimens, according to their size, side by side, not above each other, in the fold of a sheet of paper, and subject them to considerable pressure for some hours. This is necessary to give them form, and fit them for convenient disposal in the herbarium. Where paper is abundant or readily procurable (and any kind serves for drying—common bazar paper answers the purpose perfectly), two or three sheets should be interposed between each pair of plants, to absorb as much as possible of the moisture that exudes.

When they have been thus pressed from 24 to 36 hours, the papers containing the specimens must then be removed from between the others, and either replaced between fresh dry paper, or spread out in the sun, and covered with a rather thick layer of sand, say about two inches. Two days will generally be found sufficient to dry the thin leaved plants, but if that is not enough they should be so exposed daily till thoroughly dry. Thick succulent ones often require many days. The sand serves the double purpose of preventing the leaves curling and getting out of shape, and of absorbing moisture; while it retains an equable degree of heat long after the rays of the sun have ceased to supply it. If the quantity of sand is considerable, plants may thus be even well dried, without once subjecting them to any other pressure, but as it is always very desirable to preserve the forms of plants it is better to re-press them every night when taken in. The papers that were interposed and have become damp, are in like manner to be exposed to the sun and air to dry, and fit them for re-application; by attending to this rule many thousand specimens may be dried with a few quires of paper. When dry, which is known by the stiffness of the specimens and the leaves not bending or curling on exposure to the air, they may be removed to any more convenient paper for preservation; old newspapers, especially Europe ones, are excellent; but any dry firm paper answers the purpose. My own collections, now amounting to many thousands of specimens, are all kept in country brown paper—several specimens can thus be kept in one sheet, as they no longer spoil by being laid above each other.

For pressing specimens at home, the most simple method is to lay them between two boards, corresponding in size with the paper, under a large stone or other weight; but, in travelling, it is more convenient to bind them tightly with strong straps and buckles, or cords. For the latter purpose the boards should be made double; that is, of two thinner boards, disposed with the grain of the wood crossing at right angles, and united by a few nails round the edges. A board of this construction, half an inch thick, will resist the utmost force a man can apply in tightening the straps, and may be made up of any number of smaller pieces, in case entire ones are not procurable.

Several specimens of each plant should be taken, to guard against loss, and show variations of form which almost every plant presents, and are apt to mislead describers. Proceeding as above, any native, of ordinary intelligence, can be taught, in the course of a few days, both to collect and to dry plants, and are most valuable assistants in the formation of a herbarium; it being only necessary to give them a good bundle of paper, and send them to the jungle, with instructions to preserve specimens of every plant they can find bearing either flowers or fruit.

In collecting ferns, it is necessary to observe that the fruit are usually situated on the under surface of the leaves, forming scattered dots or lines, or covering the whole under side of the leaf or frond. Specimens of that tribe should always have fruit: but some species have fertile and sterile fronds, growing on the same root, of different forms—both should be taken.

The method of quick drying here recommended, in addition to the great saving of time and labour, possesses the further advantage of preserving the colours, better than the slower one of daily changing the wet papers, but of course does not always succeed; that, however, is a matter of inferior importance as it is by forms not colours that plants are distinguished in the herbarium. In wet or cloudy weather the daily changing process must be adopted.

To the Editor of the Madras Journal of Science and Literature.

Sir—With reference to a communication from me relative to an iron self-registering barometer, I beg to inform you that a scientific friend of mine at Ootacamund, who has evinced much interest in this matter, and who was good enough to compare and register the indications of a very rough iron one in my possession with his standard instrument, pointed out to me a few days ago in the second volume of the supplement to the Encyclopædia Britannica, a drawing of an iron barometer proposed by Blondeau.

As that instrument was of the syphon kind and was intended to act exactly like the one proposed by myself (the self-registering apparatus excepted), I hasten to assure you that I was perfectly ignorant of Blondeau's recommendation, and had previously made every inquiry in my power as to former suggestions on this head, and, from a correspondence with J. Prinsep, Esq. the Editor of the Calcutta Journal of Science, I was led to believe that iron had neither been tried or suggested, and would most probably be found defective. It does not appear that the iron barometer, alluded to in the Encyclopædia, was ever tried, and as the self-registering portion of my project has not to my knowledge been pointed out by former philosophers, I shall now state that the experiments I have made with the roughly formed instruments manufactured in Coorg, give me the most sanguine hopes of perfect success. The iron has been found to be air tight, but the following improvements to the drawings before sent seem to me essential to the perfection of the instrument.

At *a*, a small hole must be made for filling the instrument which must contain mercury sufficient to keep its surface when reversed at the dotted line *c*, to guard against the possibility of air passing up the long limb when set to work. At *b*, a mercurial tight stop cock should be placed taking care to leave ample room for the expansion of the mercury, which however even in this country need not be more than 3-10th of an inch, since about 30° of heat will increase the length of the mercurial column in this barometer only 1-10th of an inch.*

I remain, Sir,

Camp Neelgherries, *January* 2, 1837. Yours obediently,

G. Underwood, *Capt. of Engineers.*

Mr. Hodgson, of Nipal, in a letter received while the last pages of this Journal were passing through the press, requests us to alter the generic name of the Perdix described at page 303 from *Arborophila* to *Dendrophila*. This emendation, we are sorry to say, arrived too late to be introduced into the body of the work.—*Editor.*

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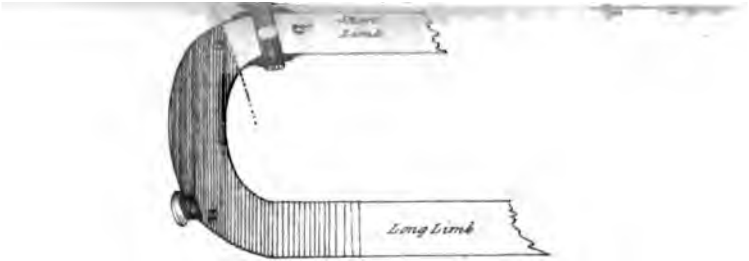
* This letter was received when the last number of the Journal was in the press, Captain Underwood's article having been struck off. It might have been introduced in a Postscript to that number, but was overlooked, for which we beg to apologise to the Author.—*Editor.*



TALOOK								Total.
Thenkeenay..								123
								61
								224
								97
								505
								125
								16
								18
								91
								2
								252
								291
								14
								6
								34
								345
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	93
	Yettoor hill	Manavanoor	33	53	62	22	15	152
		Cavunjeyoor	12	23	22	6	5	56
		Poondyoor	15	28	26	18	25	97
		Palloor	11	18	17	7	11	53
		Keelavauray	11	23	20	11	13	67
		Coomboor	4	6	5	3	4	18
			86	151	152	67	·73	443
		Total	389	583	559	288	208	1638
	Shembaganoor hill	Shembaganoor	3	3	2	4	1	10
			392	586	561	292	209	1648

N. B.—The author of the Paper on the Pulney Mountains had not this table in his possession when the article went to press, or it would have been incorporated with it.—*Vide* p. 280.

J. B. BLACKBURNE, *Principal Collector.*

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Camp Neelgherries, *January* 2, 1837. Y

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TALOOK								Total.
Thenkeena			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	123 61 224 97
			[illegible]	[illegible]	102	108	68	505
Iyunpully	Veroopautchio hill	Paryoor	33	46	43	23	13	125
		Kunnanoor	5	8	6	1	1	16
		Vadakaudoo	7	8	7	2	1	18
		Pauvaloor	23	36	30	15	10	91
		Vennaly	1	1	1	0	0	2
			69	99	87	41	25	252
	Poombaurah hill	Cusbah Poonibarah	74	105	103	51	32	291
		Palunghee	3	4	4	2	4	14
		Palumpoottoor	3	3	2	1	0	6
		Koockaul	11	15	13	5	1	34
			91	127	122	59	37	345
	Vilputty hill	Vilputty	31	39	36	13	5	93
	Yettoor hill	Manavanoor	33	53	62	22	15	152
		Cavunjeyoor	12	23	22	6	5	56
		Poondyoor	15	28	26	18	25	97
		Palloor	11	18	17	7	11	53
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J. B. Blackburne, *Principal Collector*.

electricity; for, can it *now* be doubted, that rocks impregnated with or holding in their minute fissures different kinds of mineral waters, may be in different electrical conditions or relations to each other? A general conclusion is, that in these fissures metalliferous deposits will be determined according to their relative electrical conditions; and that the direction of those deposits must have been influenced by the direction of the magnetic meridian. Thus we find the metallic deposits in most parts of the world having a general tendency to an E. and W. or a N.E. and S. W. bearing. Mr. Fox added, that it was a curious fact, that on submitting the muriate of tin in solution to voltaic action, to the negative pole of the battery, and another to the positive, a portion of the tin was determined like the copper, the former in a metallic state, and the latter in that of an oxide, showing a remarkable analogy to the relative position of tin and copper ore with respect to each other as they are found in the mineral veins.

The Chairman (Dr. Buckland) said, it had been observed to them last evening, that the tests of some of the highest truths which philosophy had brought to light was their simplicity. He held in his hand a blacking-pot, which Mr. Fox had bought yesterday for a penny, a little water, clay, zinc, and copper; by which humble means he had imitated one of the most secret and wonderful processes of nature, her mode of making metallic veins. It was with peculiar satisfaction he contemplated the valuable results of this meeting of the Association. There was also a gentleman now at his right hand, whose name he had never heard till yesterday, a man unconnected with any Society, but possessing the true spirit of a philosopher; this gentleman had actually made no less than 24 minerals, and even crystalline quartz. He (Dr. B.) knew not *how* he had made them, but he pronounced them to be discoveries of the highest order: they were not made with a blacking-pot and clay, like Mr. Fox's, but the apparatus was equally humble; a bucket of water and a brickbat had sufficed to produce the wonderful effects which he would detail to them.

Artificial Crystals and Minerals.—A. Crosse, Esq., of Broomfield, Somerset, then came forward, and stated that he came to Bristol to be a listener only, and with no idea that he should be called upon to address a Section. He was no geologist, and but little of a mineralogist; he had however devoted much of his time to electricity, and he had latterly been occupied in improvements in the voltaic power, employing a battery which he had succeeded in keeping in full force for twelve months by water alone, rejecting acids entirely. Mr. C. then proceeded to state that he had obtained water from a finely crystallized cave at Holway, and by the action of the voltaic battery had succeeded in producing from that water in the course of ten days numerous rhomboidal

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF FEBRUARY 1837.

Days.	Barometer at							Thermometer at							Rain.			Direction of Wind.			Weather at		
	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.	Evaporation.	Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1837	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	o	o	o	o	o	o	o	Inch	Inch	Inch						
Feb. 1	29,960	30,040	30,016	29,974	29,974	29,996	30,020	66,6	78,1	79,7	80,0	75,8	74,2	74,6	... ...	... ...	1,583	N. E.	N. E.	E.	F. C.	Clear	F. C.
2	,972	,058	,020	,982	,964	30,000	,004	70,3	78,5	80,0	80,8	75,9	74,2	71,	... ...	... ...	... ...	E.	E.	E.	F. C.	Clear	Haze
3	,964	,048	,026	,992	,982	,012	,018	66,9	78,3	80,8	79,9	76,2	74,8	73,0	... ...	... ...	... ...	E.	E.	E.	Clear	F. C.	Clear
4	,998	,076	,050	,996	,980	29,998	,000	66,5	78,8	80,0	83,0	76,6	75,7	74,4	... ...	... ...	... ...	E.	E.	E.	Haze F. C.	Clear	F. C.
5	,988	—	29,970	,924	,890	,910	29,914	70,2	—	80,2	81,7	77,7	74,9	72,3	... ...	... ...	... ...	S. W.	E.	E.	F. C.	Clear	Clear
6	,872	29,934	,912	,876	,878	,902	,910	68,0	77,9	78,4	80,0	77,1	74,8	72,8	... ...	... ...	... ...	E.	E.	E.	Clear	Clear	Clear
7	,896	,952	,930	,896	,902	,946	,964	65,9	76,6	79,5	80,0	77,2	75,7	75,0	... ...	... ...	... ...	S. E.	E.	E.	Clear	Clear	F. C.
8	,962	30,026	,998	,960	,962	30,000	30,000	67,7	78,8	80,0	81,7	76,2	75,8	75,2	... ...	... ...	1,588	E.	E.	N. E.	Clear	Clear	Clear
9	,988	,042	30,008	,972	,964	29,976	29,974	67,2	79,9	81,3	82,0	77,2	74,9	73,0	... ...	... ...	... ...	N. E.	E.	E.	F. C.	F. C.	Clear
10	,966	,020	29,982	,954	,940	,968	,972	67,9	78,3	81,0	81,7	77,3	76,0	75,5	... ...	... ...	... ...	E.	E.	E.	Clear	Clear	Clear
11	,930	29,988	,940	,880	,862	,952	,910	67,9	79,0	81,9	78,5	78,3	76,1	75,2	... ...	... ...	... ...	E.	E.	S. E.	Clear	Clear	Clear
12	,878	,986	,872	,816	,800	,820	,830	73,0	80,0	83,5	87,0	78,9	77,9	77,5	... ...	... ...	... ...	S. E.	E.	S.	Haze	Clear	Clear
13	,874	,954	,928	,882	,882	,918	,936	74,4	81,2	84,0	84,2	80,3	79,9	79,8	... ...	... ...	... ...	S.	S.	S. E.	F. C.	Clear	Clear
14	,948	30,027	30,000	,954	,902	30,002	,990	73,9	83,9	85,0	85,0	80,2	78,2	78,0	... ...	... ...	... ...	S. E.	S. E.	S. E.	F. C.	Clear	Clear
15	,990	,062	,040	,990	,972	,002	30,010	71,9	82,0	83,0	83,8	79,8	77,3	77,0	... ...	... ...	1,773	S. F.	S. E.	E. by S. E.	F. C.	Clear	Clear
16	,974	,040	,010	,956	,956	29,994	—	72,0	80,6	82,7	84,3	78,3	77,2	—	... ...	... ...	... ...	S. E.	S. E.	S. E.	F. C.	Clear	Clear
17	,996	,064	,044	30,000	,998	30,042	30,046	70,3	80,4	82,6	82,3	78,3	77,1	76,3	... ...	... ...	... ...	E.	S. E.	S. E.	F. C.	F. C.	Clear
18	30,036	,092	,064	,020	30,002	,030	,020	69,7	80,2	81,5	81,9	77,8	76,2	76,0	... ...	... ...	... ...	S. E.	E.	S. E.	F. C.	F. C.	Clear
19	,008	—	,026	29,982	29,932	29,984	29,994	68,1	—	81,0	82,1	78,2	76,0	74,4	... ...	... ...	... ...	E.	E.	E.	Clear	Clear	Clear
20	29,996	30,050	,022	,974	,962	,996	—	66,4	79,8	82,1	83,4	78,2	75,8	—	... ...	... ...	... ...	E.	E.	E.	Clear	Clear	Clear
21	30,014	,076	,062	30,016	—	—	—	68,5	80,4	81,9	83,2	—	—	—	... ...	... ...	... ...	E.	N. E.	—	F. C.	F. C.	—
22	,020	,096	,070	,030	30,030	30,050	—	70,2	81,7	82,0	83,4	78,5	77,1	—	... ...	... ...	1,827	E.	N. E.	N. E.	Clear	F. C.	Clear
23	,018	,056	,028	29,988	29,972	29,996	—	72,0	81,8	83,8	83,6	78,5	77,8	—	... ...	... ...	... ...	N. E.	N. E.	N. E.	F. C.	F. C.	Th. haze
24	29,978	,034	,002	,956	,944	,956	—	71,4	79,9	82,0	83,6	78,4	77,7	—	... ...	... ...	... ...	N. E.	N. E.	N. E.	F. C.	Clear	F. C.
25	,960	29,996	29,978	,932	,922	,938	—	70,5	81,3	83,7	83,9	78,3	76,2	—	... ...	... ...	... ...	N. E.	N. E.	N. E.	Haze	Clear	Haze
26	,920	—	,932	,890	—	—	—	69,8	—	83,3	83,4	—	—	—	... ...	... ...	... ...	E.	—	—	F. C.	Clear	—
27	,878	29,954	,928	,882	—	—	—	70,1	79,8	82,3	83,7	—	—	—	... ...	... ...	... ...	E.	S. E.	—	F. C.	Clear	—
28	,890	,916	,956	,910	—	—	—	70,2	80,6	81,5	85,[illegible]	—	—	—	... ...	... ...	... ...	S.	S.	S.	Th. haze	—	Haze
Mean	29,960	30,023	29,994	29,949	29,940	29,972	29,973	69,6	79,9	81,7	82,6	77,9	76,3	75,1									

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF MARCH 1837.

Days.	Barometer at							Thermometer at							Rain.		Evaporation.	Direction of Wind.			Weather at			Remarks.
	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.		Morning.	Noon.	Evening.	Morning.	Noon.	Evening.	
1837	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	°	°	°	°	°	°	°	Inch	Inch	Inch							
Mar. 1	29,920	30,004	29,970	29,946	29,932	29,910	——	69,7	81,5	83,5	84,5	80,9	78,3	—	... ...	... ...	1,804	S W	S E	S E	Clear	Clear	Clear	Dew
2	,960	,010	,966	,926	,912	,928	——	71,9	82,4	84,2	86,0	80,2	78,2	—	... ...	... ...	... ...	S W	S E	E	F C	Clear	Clear	Dew
3	,918	29,984	,956	,882	,886	,932	——	70,9	82,1	83,6	85,0	80,3	78,4	—	... ...	... ...	... ...	N	S E	S E	F C	F C	Clear	——
4	,936	30,008	,986	,950	,924	,958	29,976	69,9	83,1	84,2	85,7	81,4	79,0	78,8	... ...	... ...	... ...	S E	S	S E	Clear	Clear	Clear	Dew
5	,976	——	,998	,966	,950	,982	,996	71,8	—	84,9	86,3	82,2	79,8	76,2	... ...	... ...	... ...	W	S E	S E	F C	F C	Clear	Dew
6	,976	30,042	30,018	,976	——	——	,992	72,0	82,4	82,1	84,2	—	—	76,0	... ...	... ...	... ...	W	S E	S E	F C	Clear	Clear	Dew
7	,954	,030	,002	,964	——	——	30,000	71,7	82,3	83,0	84,6	—	—	76,0	... ...	... ...	... ...	W	S E	S E	Clear	Clear	Clear	Dew
8	,966	,031	,010	,978	——	——	29,984	69,8	82,2	84,0	85,5	—	—	77,9	... ...	... ...	2,244	W	S E	S E	F C	Clear	Clear	Dew
9	,964	,044	,024	,982	29,959	29,998	30,004	69,9	82,9	84,0	86,2	82,0	78,4	77,5	... ...	... ...	... ...	W	S	S F	Clear	Clear	Clear	Dew
10	,986	,022	29,998	,951	,922	,946	29,950	70,2	82,3	84,2	84,5	82,3	78,8	78,0	... ...	... ...	... ...	S W	S E	E	F C	Clear	Clear	Dew
11	,982	29,958	,922	,872	,876	,990	,908	75,0	83,1	85,3	84,8	81,9	80,3	79,9	... ...	... ...	... ...	N E	S E	S E	F C	Clear	Clear	Dew
12	,913	——	,942	,908	,900	,936	,956	74,3	—	85,6	89,4	82,4	80,0	79,7	... ...	... ...	... ...	S W	W	S E	F C	Clear	Clear	Dew
13	,976	30,028	,982	,934	,924	,938	,946	75,2	83,4	85,0	85,5	80,5	80,0	78,8	... ...	... ...	... ...	W	S E	E	F C	F C	Haze	Dew
14	,874	29,924	,874	,840	,824	,854	,866	76,2	84,2	85,8	87,0	82,0	80,2	79,5	... ...	... ...	... ...	W	N	S E	F C	Clear	Clear	Dew
15	,818	,884	,846	,808	,804	,834	,854	75,7	85,2	86,8	86,8	82,1	79,9	78,2	... ...	... ...	3,068	W	E	S F	F C	Clear	Clear	Dew
16	,822	,906	,874	,838	,844	,872	,894	73,2	84,7	85,6	86,0	81,9	79,8	78,8	... ...	... ...	... ...	S	E	S E	Clear	Clear	Clear	Dew
17	,890	,962	,938	,882	,870	,908	,924	71,9	84,1	84,9	85,6	81,7	80,0	80,0	... ...	... ...	... ...	W	E	S E	Clear	Clear	Clear	Dew
18	,916	,998	,975	,934	,904	,922	,952	72,8	84,2	84,9	85,6	82,3	79,7	77,6	... ...	... ...	... ...	W	E	S	F C	Clear	Clear	Dew
19	,914	——	,924	——	,854	,876	,880	72,5	—	87,9	—	84,4	82,1	79,5	... ...	... ...	... ...	S W	S E	E	Clear	Clear	Clear	Dew
20	,854	29,914	,896	29,850	,840	,862	,876	74,5	86,4	87,8	91,3	83,4	81,1	78,8	... ...	... ...	... ...	S W	S E	S	Clear	Clear	Clear	Dew
21	,822	,896	,872	,816	,830	,842	,856	74,3	85,8	86,7	86,3	82,4	80,6	78,3	... ...	... ...	... ...	S	S E	S	F C	Clear	Clear	Dew
22	,776	,836	,816	,770	,774	,820	,856	74,2	84,9	85,7	83,8	82,7	80,3	79,7	... ...	... ...	4,478	S W	S E	S	Clear	Haze	Clear	Dew
23	,830	,908	,870	,842	,838	,852	——	74,6	86,6	86,5	88,1	80,3	81,0	—	... ...	... ...	... ...	S W	S E	S E	F C	Clear	Clear	Dew
24	,902	,954	,934	,882	,856	,880	29,902	76,2	82,6	84,2	84,5	82,2	81,3	80,2	... ...	... ...	... ...	W	S	S E	F C	Clear	Clear	Dew
25	,874	,922	,884	,834	,846	,864	——	73,9	82,9	83,7	84,0	81,9	79,9	—	... ...	... ...	... ...	S W	S	——	Clear	Haze	F. C.	Dew
26	,880	——	,910	——	,838	,872	——	76,2	—	84,0	—	82,7	81,8	—	... ...	... ...	... ...	W	S	S E	Haze	Th Haze	Th. haze	Dew
27	,878	,942	,914	29,864	,834	,850	29,896	75,8	82,5	84,6	85,0	83,3	82,2	82,0	... ...	... ...	... ...	S W	S E	S E	F C	Clear	Clear	Dew
28	,812	,904	,864	,808	,776	,800	——	78,7	84,0	85,1	85,8	84,0	82,9	—	... ...	... ...	... ...	W	S E	S	F C	Clear	Haze	Dew
29	,781	,834	,792	,744	——	——	——	79,7	84,2	86,8	86,6	—	—	—	... ...	... ...	... ...	S	S E	——	Haze	Clear	——	Dew
30	,762	,808	,776	,728	——	——	——	80,2	84,9	87,0	86,3	—	—	—	... ...	... ...	... ...	S	S E	——	Haze	Clear	——	} Lightning
31	,786	,862	,824	,768	29,752	29,782	——	80,0	84,7	86,0	86,4	84,8	84,1	—	... ...	... ...	... ...	S	S E	S E by S	F C	Clear	Clear	
Mean	29,890	29,948	29,921	29,878	29,864	29,895	29,927	74,0	83,7	85,1	85,9	82,8	80,3	78,6										

The instruments with which the foregoing observations have been made, are placed upon a table about 4 feet above the ground in the western verandah of the Honorable Company's Observatory; which is situated in the longitude of 5h. 21m. 9s. E. and latitude 13° 4′ 9″ N. at about 2 miles from the sea and about 27 feet above the low water mark.

The Barometrical indications are derived from a Standard of my own construction, and require a correction + ,125 inches in addition to that due to temperature. The Thermometrical Observations are, I believe correct, the Thermometer having been found to agree with Troughton's Standard.

T. G. TAYLOR,

1st April, 1837. *H. C.'s Astronomer.*

THE

MADRAS JOURNAL

OF

LITERATURE AND SCIENCE,

PUBLISHED UNDER THE AUSPICES

OF THE

MADRAS LITERARY SOCIETY

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AUXILIARY OF THE ROYAL ASIATIC SOCIETY.

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MADRAS JOURNAL

OF

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No. 16.—*July,* 1837.

I.—*Notes on the Code and Historical MSS. of the Siamese and on the Progress of Buddhism to the Eastward.—By* Lieutenant T. J. NEWBOLD, *Member of the Asiatic Societies of Madras and Bengal.*

With reference to the subjoined notes on the spread of Buddhism to the east, as connected with the notice of the Siamese MSS. lately presented to the Society, I will briefly state in explanation that, during a period of service in the Straits, my attention was powerfully attracted, by the prevalence of Hindu words in the construction of the language of the Malays, and in the names of places met with in their historical MSS., to a consideration of their literature, religion, and written character prior to the introduction of Mahomedanism.

From the almost total absence of records, among the Malays of the peninsula, anterior to this important era, I was compelled to seek their history through the medium of that of their neighbours, the Siamese —the Aborigines of the peninsula—the Javans, the Bugis, the Battaks, the inhabitants of Menangkábowe, and even from the Chinese. In the course of these enquiries, made, as opportunity offered, from natives of these countries themselves, the great prevalence and antiquity of the religion, and alleged similarity of the written language of the Buddhists of eastern and western Asia came under discussion. The result was an impression on my mind that Buddhism, propagated either from Ceylon or the continent of India (in a few instances supplanted by Brahminism), was originally engrafted on the rude, natural religion of the islanders, on the Sinterism of the people of Japan, the tenets of *Taon*, and the doctrines of Confucius in China—that the Sanscrit, prevailing in the dialects of the most civilized nations of the Archipelago, was introduced through the medium of the *Pali*, the language in which it appears the religious writings of Buddha were brought from

India, and in which Mr. Gutzláff lately heard the Buddhist priests, in one of the islands on the east coast of China, chant the sacred rites of this religion. The religion, language, and its written character will have doubtless suffered considerable change by coming in contact with those of the various nations among whom they have been transplanted, and that the *Páli*, or Sanscrit (as will probably be found the case with regard to the various dialects of peninsular India known under the Brahminical appellation, *Prácrit*) is not the root of the living languages of the Archipelago but merely a graft—as Arabic in the Persian Malay and Hindustani, and Latin in our own language.

In order that these impressions might be corrected or confirmed by the written evidence of history, I resolved to procure copies of the most ancient annals, codes of laws, alphabets and written characters of the Ultra Gangetic nations, but before the collection had made much progress my Regiment was ordered to Madras. I feel convinced that a careful collation of the annals and sacred books of Burma, Siam, Khohman and Laos in the *Páli* dialects, and of Java and Bali in the *Káwi*, of the religious books and inscriptions of the Buddhists of China and Japan written in the sacred characters of the *Fan-yu*[*] and *Bon-se* (supposed to be modifications of *Páli* derived from India) with those of Ceylon and Southern India, together with the opening of the hidden resources contained in the great native libraries, fac-similes of inscriptions of the Buddhists of *Magadha* and of the *Jainas* of the peninsula,[†] will by mutual illustration serve to shed considerable light over the chronology and history of India and eastern Asia, as well as to test the forgeries suspected to exist in the apocryphal writings of the Brahmins, and perhaps to solve the long contested point regarding the greater antiquity of the religion and language of the disciples of *Buddha* and *Brahma*. For this purpose the writings of the Brahminical philosophical schools might also be more minutely examined with advantage. Goverdhan Caul (who appears to have been of the Brahminical faith), in his article on the literature of the Hindus from the Sanscrit observes, "We need say no more of the heterodox writings, than that those on the religion and philosophy of *Buddha*, seem to be connected with some of the most curious parts of Asiatic history and contain, perhaps, all that could be found in the *Páli*; or *sacred language* of the Eastern Indian peninsula."

It is necessary to add that these speculations would not have been obtruded in their present imperfect form, had not the interest lately excited among Indian *literati* towards the history of this singular and widely extended religion, as regards Ceylon and Southern India, by the announced publication of a translation of the Mahawanso and the promised opening of the Mackenzie MSS., led me to hope that their communication might perchance contribute to stimulate among the many highly talented sojourners in our settlements to the eastward, a corresponding enquiry into the ancient records of the Buddha priests of Japan—China—of the Indo Chinese nations, and of the aboriginal tribes of the Indian Archipelago, as they stand in relation to those of India and Ceylon. In this spirit the following notes are proffered. The inferences and quotations they contain are adduced rather with the view of courting investigation, than for the purpose of establishing a theory.

---

[*] For the alphabet and specimens of the written characters of these languages I have already written : should they be procured copies, or the originals, shall be forwarded to the Society.

[†] Many valuable manuscripts on the religion of the *Jainas* collected by Mr. Wathen, are deposited in the library of the Bombay Literary Society; still, I believe, awaiting translation.

The historical records of Siam may be divided, like the nation itself, into two classes—the ancient and the comparatively modern. The *T'hay J'hay* and the *T'hay.* I am not aware that copies of the former have ever been procured by European collectors; though, from the testimony of Leyden, corroborated by that of several intelligent Siamese with whom I have had oral communication on the subject, there can be little doubt of their existence. According to La Loubére, who visited Siam in 1687-8, the *T'hay J'hay* or ancient nation of Siam was then in a state of barbarity compared with the more modern *Thays.* Leyden distinctly states that they were formerly famous for their learning and the power of their empire, that many monuments of this ancient race still exist in the kingdom of Siam, and that in the vicinity of Ligore, there are various ancient inscriptions on stone, among the ruins of a very ancient temple, which are attributed to the *T'hay J'hays*, but which no person among the moderns was able to decipher. The annals of the *T'hay* dynasty, according to the same author, commence only from the building of the city *Maha Nakhon*, a little more than 1400 years ago. The ten volumes MS. now sent to the Society constitute a portion of this modern version, commencing in the 712th year of the Siamese era. The book of laws is a compend of the civil code of Siam; it is divided into two parts—the first comprises an introduction and a chapter containing 33 sections, embracing regulations for the protection of agriculturists, trespasses committed both by men and animals—stealing of rice, agricultural implements, water for purposes of irrigation, removing of land-marks, &c. Part the second contains 12 chapters with an introduction and preamble. It treats principally of the fines and punishments for making false claims to the property of others, pawns, mortgaged lands, water-rights, recording of deeds, the laws of borrowing, buying and selling, gambling, quarrels, the properly securing of elephants, cattle, &c. and concludes with a chapter of regulations against sorcery, witchcraft, administering love philtres and potions, to cause madness or abortion, and against improper exposure of corpses. The leading feature in the land regulations is the right of the sovereign to all land; a law which appears to prevail almost universally both in the Malay peninsula and Indian Archipelago. In fact there appears to be a family resemblance in all these codes; which it would not be devoid of interest to trace to its source.

I shall endeavour to procure a copy of the more ancient records of Siam; which, it may be reasonably surmised, will throw much additional light on the obscurity that shrouds the origin of this singular nation, and on the introduction of the religion of *Buddha* into Siam; the history of which is intimately connected with that of almost every nation from the mouth of the Indus to the eastern confines of Asia. The Buddhism of Siam is said to resemble the form prevailing in Ceylon, more than the Buddhism of China, Tartary, Hindustan and Japan: but this point requires more careful consideration and analysis. It appears to be certain that both the Burmese and Siamese acknowledge to have received their religion from Ceylon, though it is probable the former received it through the ancient *Magas* or *Mughs* of Aracan. *Buddha* it is well known is supposed to have been born at *Cicatá*, a place said by the learned author of the *Bhagawatomarita* to have been a wood near *Gaya*, an ancient city of south Bahor or *Magadha* the kingdom of *Bali*, through which flows the river *Fulgo*,* supposed by Major Wilford to be the *Caenthis* of Arrian. The date of his birth or incarnation is fixed by Sir W. Jones at about 1,000 years† before Christ. Major Wilford informs‡ us that the ancient and most extensive empire *Magadha* was named from the families descended from the sage Maga, the offspring of the Sun and the grandson of the venerable *Twashtah* in the west, and who came into India in the time of Krishna, from these are sprung the *Magas* (or Mughs) of Bengal and Arracan. The old kings of *Magadha* gave great encouragement to learning, and it is said there were elaborate treatises on religion and almost every science in the *Magadhi Báli* or *Pali* dialects. Major Wilford it appears was not successful in his researches to obtain copies, which he supposes, if they do exist, are to be found among the followers of *Jaina*. The high degree of civilization and commercial influence of the empire of *Magadha* and the city of *Pali Putra*, the supposed *Palibothra* of Ptolemy, said by Diodorus Siculus to have been built by the Indian Hercules *Bala*, is attested by Arrian in his Periplus, and in the *Pentingerian* tables. Major Wilford mentions having seen an inscription in *Páli*, found in Bahar, written in the Burmah character, which he was unable to decipher. According to Mr. H. T. Colebrooke,* the religious books of the Jains are written in the Prácrit called *Magadhi*, which he believes to be the *Páli* of Ceylon, and cites one of their works, the *Calpa Sútra* composed about 1500 years ago, written in this language, observing that the Sanscrit language is used by the *Jainas* for translations or for commentaries, on account of the great obscurity of the Prácrit tongue.

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* As. Res. ix. page 32. † As. Res. ii. page 125. ‡ As. Res. ix. page 74.

Major Wilford with considerable ingenuity and much research traces the intercourse that formerly prevailed between Magadha, Nepal, Thibet and China. But the spread of Buddhism southerly to the peninsula of India and the island of Ceylon, is by no means satisfactorily elucidated. The translations of the Mackenzie MSS. and that of the *Mahawanso* will throw much light, it is to be expected, on this part of Indian history, as well as on the expedition of *Rama* and the expulsion of the *Jainas*, who are identified with the Buddhists. It is certain that at a very early period fierce disputes arose between them and the Brahmins, which terminated in the expulsion of the former from the shores of India. Many took refuge in Ceylon, and probably some few contrived to escape to Java, Sumatra and other islands to the eastward.

Date of Expulsion from India. The date of this event or events, as well as that of the expedition of *Ráma*, with which perhaps the first persecutions of the Buddhists by the Brahmins may be found to be connected (Hémachundra, an ancient Jain author enumerates among the nine foes of Vishnu the king of Lanca Rávaná, and the king of Magadha, Jará Sandha both probably worshippers of Buddha (As. Res. IX—316), are epochs, the fixing of which I take to be of considerable importance in Indian history. Their final expulsion from the Deccan was not effected, according to Mr. Chambers, until so late as the 9th or 12th century of the Christian era; and, according to the Hindu author of a history of Cashmir translated by order of the emperor Akber, it was not till the reign of *Naikh* the 59th prince of Cashmir, that the Brahmins of Cashmir got the better of the followers of *Buddha* and burned down their temples. Dr. Francis Buchanan† fixes the reign of *Naikh* at about A. D. 342.

Arracan and Burma. We shall now attempt to trace this singular religion eastwards. It appears certain that the people inhabiting the countries immediately to the eastward of the empire of *Magadha* soon adopted the tenets of *Buddha*—among the rest the *Mughs* or *Magas* of Arracan; from which nation, Buchanan is of opinion, the Burmese received their religion, laws, and government, about 600 years ago; though by the Burmese themselves a much earlier date is ascribed to this event.* Buchanan himself admits that the Burma code, more than 600 years old, was introduced from Ceylon; and, according to their own chronological tables, procured by the late embassy, their first monarchs are said to have come† from Magadha, more than 300 years B. C.

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* As. Res. IX. page 310.

† As. Res. VI. 165.—Mr. Colebrooke asserts (As. Res. IX. 294) that this passage cited by Dr. Buchanan is not supported by the Persian or Sanscrit text.

Colonel Symes states, " As an incontestible proof that the Burmans acknowledge the superior antiquity of the Cingalese, and the reception of their religion and laws from that quarter, the king of Ava has sent, within these few years, at separate times, two messengers, persons of learning and respectability, to Ceylon, to procure the original books on which their tenets are founded; and in one instance the Burman minister made an official application to the Governor General of India to protect and assist the person charged with the commission." It seems a reasonable conclusion from the statements, as well as from what the Burmese themselves aver regarding the antiquity of their religion, that it originally came, before the Christian era, through Arracan, from the empire of *Magadha* direct—that on the decay of this Buddhist empire and ascendancy of the Brahmins, they were compelled on religious matters to communicate with Ceylon; the sanctity of which island must have been considerably increased by the influx of Buddhist priests from India.

Siam. The introduction of Buddhism into Siam, I am assured by several natives of that country, took place at a very remote period from Ceylon; these assertions are corroborated I find by their popular records, which are remarkably clear and decisive on this head; for instance‡, " Five hundred years after the decease of *Samono Godam* (Gaudama), there were three kings in the island of Ceylon, who, together with the *rahans* or priests, assembled to consult on matters of religion. One of the kings inquired, whether any person present had ever seen the deity during his life time. All replied in the negative. One of the *nâks*, knowing their conversation, instantly left his residence, came through the air, and presented himself in their assembly, saying, that he had seen the deity during his life time, and could create a perfect representation of him. This he accordingly did, and the kings and people sacrificed to it for seven days, and seven nights successively. The *nâk* then assumed a human form, and prostrated himself in humble adoration before the priests; after which he resumed his own nature and returned home, and with him disappeared his representation of the deity. But the kings, priests, and people determined to make a brazen image of it. One of the workmen employed in casting the image, offended one of the kings, who struck him and wounded his forefinger. The power of fate following this act of the king, destroyed one of the fingers of the image. This king proposed to replace it, but one of the priests dissuaded him, and by his knowledge of futurity prophesied that at some future time the statue should be conveyed on the great sea (the bay of Bengal), to the extremity of its waters, where a great king should replace the deficient finger.

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* As. Res. vi. p. 302. † Hamilton's Gazetteer—art. Ava.

‡ Chinese Repository, vol. iv. p. 177.

" In the year 700 of the Buddhist era, there was a mighty monarch governing Siam, whose capital was Soökcoty; his fame extended from the Ganges to China, and from the extreme north to the ocean (gulf of Siam). He had heard of this famous image in Ceylon, and wished to sacrifice to it: and to effect this he employed the rajah of Ligore to send an embassy and beg it of the Ceylonese king. That king being reminded of the ancient prophecy consented. On the passage back, the ship was sunk, and all the seamen perished; but the image, possessed of *innate glory* (which is proved at large in the Buddhist books), floated towards the country of Ligore, seated on the back of the great ocean (bay of Bengal). The rajah, admonished of the fact by a *taywadah*, who appeared to him in a dream, sent vessels to receive it, and prepared a great abundance of offerings (which, after being presented, he was careful to take away). The image being so graciously received, made a display of its wonderful power, by rising of itself, and floating about in the air. Astonished at this, the rajah hastened to inform the monarch of Siam, who after innumerable offerings conveyed it to his capital." It may be remarked that the idol was received at Ligore, where mention is made by Leyden, of a very ancient temple alluded to in the early part of this note.

The Siamese, according to Leyden, have also traditions that their religion was introduced from Laos; but until the ancient records of this nation and of the *T'hay J'hay* tribe can be examined, we must be content with the inference that they were indebted for their religion to Ceylon, about the 2d century of the Christian era.

Laos, Cambodia, Cochin China, and Tonquin. Regarding its introduction into the countries lying between Siam and China, viz. Laos, Cambodia, Cochin China and Tonquin, little is known. The records and sacred languages of these singular countries, are yet *desiderata.* Leyden[*] states, that it is in the country of *Lán* or Laos, that all the celebrated founders of the religion of *Buddha* are represented to have left their most remarkable vestiges. *Ceylon* boasts of the sacred traces of the left foot of *Buddha,* on the top of the mountain *Amála-*

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[*] Dissertation on the Languages and Literature of the Indo Chinese nations, p. 104.

Sri-padi, or Adam's Peak. *Siam* exhibits the traces of the right foot on the top of the golden mountain *Swa-na-bapato.* Other traces of the sacred steps, are sparingly scattered over *Pegu*, *Ava*, and *Arracan*: but it is among the *Laos*, that all the vestiges of the founders of this religion seem to be concentered—and whither devotees repair to worship at the traces of the sacred steps of *Pra-ku-ku-sôn*, *Pra-kôn-na-kôn*, *Pra-put-t'ha-kat-sop* and *Pra-sa-mût-ta-ko-dom.*

The description of Cambodia by a Chinese traveller, translated by Remusat, mentions the prevalence of three great religious sects there, viz. the *Chon-kon*, or Buddhists, the *Pan-ke*, or literary sect, and the *Taon-passe*. These would appear to correspond with the *San-kon* or three religions of China, viz. those of *Confucius*, *Buddha*, and that of the philosophers or heretics, as the disciples of *Laon-keun* are styled.

The city of Saigon in Cambodia, we are told by Lieut. White, of the American Navy, in his account of Cambodia, is crowded with temples dedicated to *Buddha* similar to the Chinese pagodas.

China. Sir Wm. Jones, in his seventh discourse, on the Chinese, states his opinion that the religion of Buddha or *Fo*[*] was introduced into China from India in the first century of our era. Major Wilford with more minuteness fixes the date of its introduction in the year 65 A. C. This he does on the authority of Pliny, which amounts merely to the report of one of the four Cingalese ambassadors to the emperor Claudius, who began his reign in 44 A.D., that the *Seres* (Chinese?) lived beyond the Haimada or snowy mountains, and that they were often seen and visited by the Cingalese through commercial intercourse, and that whenever caravans from Ceylon went there, the *Seres* came in a friendly manner part of the way to meet them. Major Wilford thinks that there can be no doubt that the Cingalese went first by sea to the country of *Magadha* or the Gangetic provinces: where their legislator *Buadha* was born, and his religion flourished in the utmost splendour; and thence, with the caravans of that country, to China, through the great route mentioned by Ptolemy from *Palibothra*. M. De Giugnes and others prove the subsequent intercourse prevailing between India and China.

As doubts have arisen, notwithstanding the authorities just adduced, regarding the introduction of Buddhism into China from India, we will hear what the Chinese themselves say on the subject. They constantly aver that *Froh* or *Buddha* came from the west. In the west they place his paradise. [†]The emperor *Ching-Tih*, who died A. D. 1520, meditated sending an ambassador with expensive presents to

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[*] Mr. De Giugnes asserts on the authority of four Chinese historians that Fo was born 1027 years before Christ.

[†] Indo-Chinese Gleaner vol I. page 150.

India with the view of bringing the most learned of their Buddhist priests into China to explain more fully the original tenets of their sect, a purpose from which his minister *Wang-Yang-Ming*, who was a man of letters and a philosopher, attempted to dissuade him in an eloquent address, wherein allusion is made to the tenets of *Fuh* as a religion which had its origin in the distant countries of the west, and to *Fuh* himself as being the sacred sage of foreigners. It may be here remarked that the Chinese have no character whose initial sound corresponds with B; consequently their pronunciation of the word *Buddh* would be P'hudh, or *Fut, Fuh.* The emperor *Mingti*, who is supposed to have flourished during the first century after Christ, sent ambassadors into India, in consequence of a saying of Confucius, viz. that the most holy was to be found in the west, who returned with the books and doctrines of *Buddha.* These did not make much way against the doctrines of Confucius until about 518 A. D. when a Buddhist priest named Darma or D'herma (an Indian name) came into China from *Seitensku* which, says Kæmpfer, according to Japanese explanation, means, that part of the world which lies westwards of Japan. On the island of Honan there is a large Buddhist temple called the *Fut-kaon*[*], containing many inscriptions indicating the origin of their religion. For instance *Hoe-teen Fok-te* the "happy region near the sea." *Nam-teen-fut-kwok* " the nation of *Buddha* in the southern region."—*Hoe-van Poo-te* " the god *Buddha* on the shores of the sea." Three large images of the *Jam-pow-fut.* The three precious Buddhas, past, present, and future. In this temple there is a single image of *Amida* (immeasurable) *Buddha*; in Chinese called *O-mi-to-Fuh-ti.*

Corea.—Shortly after the appearance of the Buddhist priest *Darma* in China, Buddhism made rapid progress to the east.[†] The first idol to *Buddha* in the peninsula of *Fakkusai* or Corea was erected in 543 A. D.[‡] Professor Wilson states the introduction of this religion into Corea to have taken place A. D. 530.

From Corea it may be traced to Japan and the Chusan group; one of which, the island of Poo-to, was visited lately by Mr. Gutzlaff the missionary.[§] The immense number of Buddhist temples and priests, sixty two of the former and two thousand of the latter, on this small island, the area of which does not exceed 12 miles, can only be accounted for by supposing it to be a place of peculiar sanctity where *Buddha* is supposed to have first made his appearance. This is corroborated by the large inscriptions hewn in rocks of solid granite, and the many gigantic statues of Buddha. The highly picturesque scenery of the* island itself, with its "many peaked, riven and detached rocks," and a stately mausoleum containing the bones and ashes of thousands of priests, are confessed by the worthy missionary to have totally bewildered his imagination. The vespers of the priests Mr. G. says were chanted in the *Páli* language, not unlike the Latin service of the Roman church. They held their rosaries in their hands, which rested folded upon their breasts; their service was regulated by the tinkling of a small bell, and they occasionally beat the drum and large bell to rouse *Buddha* to attend to their prayers.

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[*] Indo Chinese Gleaner vol. III. page 236.

[†] Kæmpfer.

[‡] Preface to Sanscrit Dictionary.

[§] Quarterly Review, vol. LI. page 475.

Japan.—Buddhism can be traced distinctly from Corea to Japan (Niphon) in the† 6th century of the Christian era. According to the Japanese annals‡ in the year 552 A. D., the king of Fioksae in the west of Corea, sent an embassy to the *Daii kinméi*, with an image of *Buddha* and his classical books. Professor Wilson states that the year 572 was remarkable for the arrival in that kingdom of an immense number of priests and idols. The Japanese annals inform us that this religion, after having encountered some persecutions, soon triumphed and that about A. D. 600, two zealots of great influence, one the cousin of the empress, built temples and invited priests from Corea. In A. D. 805, the *Darri kwanmu* caused idols of *Buddha*§ to be placed in the imperial palaces, and the sacred books procured from India to be read and explained in the temples.

The traditions of the Japanese, according to¶ Kæmpfer's Japanese author, relate that about a thousand years ago there was in *Tientensiku* (that is the middle *Tensiku*, whereby must be understood the country of the Malabarians and the coast of Coromandel in India) an eminent *fotoke* called *Mokuren* a disciple of Siaka (the Sacya of Sir W. Jones), and that about this time the idol of *Amida* (*Buddha*) appeared at a plain in Japan called *Naniwa* environed with golden rays.

In an extract from the Chinese work the *Chow-hoo-too-peen* we find, towards the close of the 14th century, that the emperor *Hung-woo* sent a Buddhist priest to Japan with a command for that nation to venerate Buddha.

Mr. Meylan, in his late publication on Japan, published at Amsterdam. states that the *Dairi* or spiritual emperor still allows strange gods to be imported from Siam or China.

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* According to Japanese annals in the reign of the successor of the emperor Sensin, who died A. D. 70, a celebrated personage arrived from India riding on a white horse and bearing in his hands a sacred book.

† Chinese Repository, vol. III. page 158.

‡ The period in which the building of the Buddhist temples in Java commenced—Raffles's Java—vol. II. page 86.

§ Chinese Repository vol. III. page 203.

¶ History of Japan vol. I. p. 157.

Loochoo. We find from the Chinese official memoirs[*] concerning the Loochoos (published first in the reign of *Kang-ke*, about A. D. 1700 and extended to the 13th year of the reign of *Kew-king* A. D. 1808 printed at Pekin) that the people of the Loochoos are followers of *Buddha*, and that they say, about 1275 a Buddhist priest was driven on the island in a boat, whence he came they know not, and that they have had priests ever since. The priest was probably a native of Japan or Corea. Mr. Fisher, a late writer on Japan, saw at Nagasaki some Corean barks, which are occasionally driven on the southern coast of Japan; and it is not very improbable that some may have drifted so far south as the Loochoos.

Sumatra. Having thus far traced the progress of Buddhism from *Magadha* and Ceylon, over the southern regions of the continent of Asia to its most eastern confines, I will attempt to follow its track through the Indian Archipelago. Assuming that the Buddhists, at some very early period, were driven from the shores of peninsular India, it is very reasonable to suppose that many of them would take advantage of the numerous trading vessels lying in the southern harbours, and escape either to Ceylon, or seek a more distant and secure asylum in the ports to the eastward, with which it is a well authenticated fact they had long been in the habit of carrying on an extensive system of commerce. The first land of any importance made would be probably the Tenasserim coast, or the northern extremity of Sumatra, Achin; and where the general prevalence of mutilated Hindu images is noticed by Sir S. Raffles (Memoirs page 384); whence it is fair to suppose that the prows of the refugees would be turned towards *Menangkâbowe*, a very ancient empire the capital of which, *Pagarnyong*, was situated in the heart of Sumatra, and the sway of which extended formerly over the whole of this large and fertile island. The literature, language, and the Buddhist images discovered by Lieutenant Crooke at Jambi, and the *Kawi* inscription in *Menangkâbowe* by Sir S. Raffles, go to bear out this notion. The Revd. W. Taylor, in some learned and obliging remarks on my brief note touching the *Batta* tribe, has fully established the identity with the Sanscrit *(Pàli?)* of many words existing in the present languages of the neighbouring tribes of Battas. Lieutenant Crooke mentions the existence of a nation of idolaters, in the vicinity of *Jambi*, called the *Kúbus*[†], subject to the sultan of Palembang. The strong inclination of many of these tribes in the interior to the doctrine of the metempsychosis (still partially entertained by the Malays both of Sumatra and the peninsula of Malacca), and the religious veneration in which they hold the names of their ancestors, are now the almost only indications of the tenets of *Buddha* which formerly prevailed to a certain extent.

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[*] Indo-Chinese Gleaner, vol. II. page 9. [†] Appendix to Anderson's Mission, page 389.

Java. The fixing any date for the first introduction of Buddhism into Java must perhaps mainly depend upon that of the expulsion of the Buddhists from the peninsula of India by Brahminical persecution; without we entertain the supposition that this religion was in the first place introduced and taught by the early Buddhist traders from India or Siam, and afterwards established by the subsequent colonizations of the refugees. To the later settlers may be ascribed the erection of temples and idols to *Buddha* and the formation of a regular priesthood. The Javans we know, date the commencement of their era (A. D. 75) from the arrival in Java of a personage named *Adi-Saka* or rather *Saca*, which according to Sir Wm. Jones is a name for *Buddha*, and at all events is the title, according to Major Wilford,* of the six glorious monarchs, who gave rise to six subordinate periods, into which the Caliyuga is divided. The third of these, *Salivahana Saca* was born at *Sa'leya Dha'ra* in the Deccan, and established an era nearly corresponding to that of the Javanese *Saca*, and which is used by the Buddhists and natives of Southern India to this day. In a chronological work of the Javans, said to be written by *Aji Jáya Báya*, we are told that in the 10th year† of the Javan era 20,000 families were sent to Java by the prince of *Kaling* (or *Kalinga*) who prospered and multiplied. Most of the Buddhist temples in Java appear to have been built between the 11th and 14th centuries, corresponding with that ascribed to the final expulsion of Buddhism from India. From Java it may be traced eastward to the now Brahminical island of *Bali*. From those of *Lombok*, *Sumbawa*, *Flores* and *Timor* to the confines of New Guinea little is known. The vast unexplored island of Borneo is said to contain ruins of temples, in which are found inscriptions in characters unknown both to the natives of the island, the Chinese, and the Malays. In Celebes is said to exist an ancient and recondite language, like the *Páli* of the Siamese, or the *Káwi* of the Javans. Many of the best informed Pugis assert their Hindu origin, and their language bears evident traces of *Sanscrit* or *Páli*.

Whether it ever reached the Philippines is matter of doubt—the Spanish missionaries on the islands have, it is said, taken great pains to extirpate all the ancient records of the *Tagála* races, in which the history of their religion and the deeds of their heroes were celebrated in poems and songs.

Malay Peninsula. South of the Siamese provinces, few indications are found on the Malay peninsula of the Hinduism which is supposed by many intelligent Malays to have formed the religion of its chief princes, prior to the introduction of Islam, from which the commencement of the authentic history of the Malayan nation can alone be lated. If reliance can be placed on the traditions of the Malays, they possessed religious books and a code of laws written in a character now unknown (probably a modification of the *Káwi*), of which the zeal of their Mahomedan converters have obliterated every vestige. The many Hindu words, in the body of the language, still in use, the frequent allusions in their popular historical romances and poems, to the Ramayana and Mahabharat, contribute to strengthen the plausibility of these traditions. It is certain that, at a very early period, a considerable intercourse subsisted between the peninsula of Malacca, India, and Siam. From one or both of these sources we must attribute the introduction of Hinduism or Buddhism.

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* Chronology—Kings of Magadha. As. Res, ix. 83.

† Raffles's Java vol. ii. page 68.

In the *Sejára Maláyu* we are informed that *Raja Suran*, the monarch of *Amdam Nagara*, and founder of the city of *Bijanagar*,* penetrated to the southern extremity of the peninsula, with an army amounting to one thousand and two lacs of men from the country of Kling (Kalinga), with an intention of invading China. He marched by *Perak* southerly to the country of *Glangkin*, which appears to have been formerly a great kingdom on the *Johore* river, where he defeated and slew its sovereign *Raja Chulan* ; who, according to the Malayan historians, was superior to all the *Rajas* of the countries lying under the wind. This kingdom was probably that of *Zabaje*. According to Major Wilford,† " In the peninsula of Malacca, was the famous emporium of *Zába* : *Zábája*, in Sanscrit, would signify those of *Zába*. The empire of Zábáje was thus called probably from its metropolis *Zaba*, as well as the principal islands near it. Zába was a famous emporium even as early as the time of Ptolemy. It remained so till the time of the two Musulman travellers of Remandot, and probably much longer. It is now called *Bátu Sábor*, on the river *Johore*, which is as large as the *Euphrates*, according to these two travellers ; who add that the town of *Calabar*, on the coast of Coromandel, and ten days to the south of *Madras*, belonged to the Máháràja of *Zabaje*." The wars of this *Maharaja* with the king of *Al-Comr*, or countries near *Cape Comorin*, are mentioned by the two Musulman travellers, in the ninth century : and it seems that, at that time, the Malayan empire was in its greatest splendour. *Johore* in 1511 became the capital of a Musulman empire, but is now dwindled into a small fishing village. The chief still retains the title of sultan of *Johore*. It is in the vicinity of this place and the capital of Malacca that remains of the ancient religion, temples, sculptured inscriptions and idols, if they do exist at all, are to be looked for. Not far from the mouth of the *Johore* river, on the island of Singapore

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* The present city of Bijanagar was founded in 1336 by two brothers named Aka Hurryhur and Bucca Hurryhur, on the traditional site of one still more ancient.

† As. Res. ix. page 39.

(*Singhapura*), near the point of the river, is a large stone bearing an inscription in a character which has hitherto, I believe, resisted the efforts of all decipherers, Sir Stamford Raffles among the rest.

At Malacca and the states in the interior my efforts were unavailing to procure a single inscription or sculpture, prior to Mahomedanism. My enquiries, not confined to the Malayan tribes, extended to the savage aborigines, inhabiting the wilds and forests of the peninsula, but not a vestige of Buddhism was to be traced—save their veneration for these ancestors, the partial belief of a state of future existence in the west, and the imperfect notions entertained by them of the metempsychosis.

Identity of the sacred language among the Buddhist nations of Eastern Asia. The *Káwi*, the sacred or poetical language of the Javans and Balinese, bears great affinity to the *Pali*. Most of the inscriptions found in the Buddhist temples of Java, their ancient religious works, poetical epitomes of the *Ramayana* and *Mahabharat*, are written in this language. The characters are square, many of them corresponding exactly with those of the *Pali* of Burma and Siam.[*] The knowledge of these ancient characters, like those of China and Japan, is confined to a few individuals. Some of the *Káwi* inscriptions, it is alleged by natives, go back as far as the beginning of the 6th century of Salivahana[†], though Mr. Crawford contradicts this.

Sacred languages of the Buddhists of the Indo-Chinese kingdom. There appears to be little doubt that the sacred language of the Buddhists of *Magadha* and Ceylon, Burma and Siam, is essentially similar, though varying considerably in its written character. According to Major Wilford, *Magadha* and *Pali* or *Bali* are considered synonymous by the people of Siam, Ceylon, and Burma[‡]. Leyden and Kæmpfer inform us that among the Indo-Chinese nations the *Pali* is frequently denominated *Sanka-basa*, *Maccata-pasa* or *Magadhi-bhasa*, i. e. languages of Ceylon or *Magadha*, plainly indicating its origin. In Ceylon the terms *Magadhi* and *Pali* are both applied to it.

Sacred language of China and Japan. The sacred language of the Buddhists of China is termed the *Fan-yu*—the language of *Fan*, (India ?) where they suppose *Fuh* or *Buddha* was born. Having few books, particularly modern works on Chinese philology, to refer to, I do not know whether this language has ever been examined, or specimens of its written character given by European writers. If not, a notice of its construction, with an alphabet and vocabulary at the hands of any Chinese scholar, would be highly interesting, as well as of those of the *Bon-se*, the language and character in which the sacred writings of the Buddhists of Japan are written. It is probable they will both be found polysyllabic, and to bear great affinity to the *Pali* and *Magadha* languages of India, Ceylon and Siam, &c. Both the *Bon-se* and *Fan-yu* are unknown to the laity of China and Japan, and the written characters are said to be very dissimilar to those in common use. That of the *Fan-yu* is said by the Chinese* to have existed unchanged from the commencement of the world, as is the *Magadhi* by the Cingalese. The *Bon-se* of Japan is said to be of divine origin, and to have been first introduced from *Fiaksae*† in the west of Corea A. D. 552. The sacred books of *Buddha* were subsequently procured from India by the *Dairi-kwanum* in 805. Although the priests of China and Japan make use of these languages, in their idolatrous rites, I was assured by some Chinese officials at Malacca, that the *Fan-yu* was seldom understood even by the priests themselves, and this is probably the case with the *Bon-se* of the Japanese. The *Fan-yu* is no doubt the language in which Mr. Gutzlaff, the missionary, heard the Buddhist priests of the island of Poo-to, one of the Chusan group, chant their vespers, and which he states to have been in the *Páli* language.

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[*] Mr. Medhurst, when at *Sangora*, a Siamese town on the east coast of the Malay peninsula, wrote out the Japan alphabet for the Buddhist priests there, who were much struck with the great similarity existing between the characters composing it and their own. *Journal of a Voyage up the east coast of the Malay peninsula.*

[†] Crawford's Archipelago, vol. II. p. 213.

[‡] Dissertation on the Languages and Literature of the Indo-Chinese nations, page 121.

Identity of Deity and Religion. The Burmese and Siamese worship *Buddha* under the names of *Gaudam* or *Gautama*. The Chinese under that of *Sheh-kea*, and the Japanese adore him under the appellation of *Saca* or *Sacya*, spelt by the Dutch *Siaca*, and by the Portuguese *Xaca*. The *Pirt* of the Siamese, the *Fuh* of the Chinese, and *Bodso* of the Japanese, are used as general terms for the deity among these nations, and are evidently corruptions of the word *Buddh* or *Buddha*.‡ The names given by the Hindu Buddhist§ *Amaracosha*, to the last supposed incarnation of *Buddha*, viz. *Sacya*, *Muni*, *Gautama*, &c. clearly identify him with the present *Sheh-kea* or *Sacya* of the Chinese and Japanese, and the *Gaudam* or *Gautama* of the Siamese, Cingalese, and Burmans. The identity of these deities is further proved by the testimony of Francis Buchanan, who saw the Chinese ambassadors worshipping the images of *Buddha*, at the capital of the Burmese empire, as if their own, and by that of a Chinese, long resident at Siam, who informed me there was but little difference in his religion, and that of the Siamese, and that they worship the same images.¶ The *Adi Saca* of the Javans, who is supposed to have introduced a new form of letters and religion into Java A. D. 75, and from whose arrival on their island the Javans date their era, was probably a Buddhist priest of peculiar sanctity from India, cotemporary with *Salivahána Saca* himself, who flourished and introduced into India at this period the era of *Salivahána*, a name by which he was distinguished among the six Sacas, who give their names to the six periods, into which the *Cali-yug* is divided. *Saca*, in Sanscrit, literally signifies an age or era; but, according to Wilford,* the six periods are called *sacas*, because they divide their origin from these six monarchs.

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* Indo-Chinese Gleaner, vol. III. p. 143. † Chinese Repository, vol. III. p. 203.

‡ For the explanation of the Chinese corruption *Fuh*, vide page 9.

§ As. Res. vol. II. page 123—4.

¶ Mr. Gutzlaff in his journal of a residence in Siam states, that he saw the Chinese make offerings to an idol of Buddha in a temple at *Kokram*.

The leading doctrines of the metempsychosis, preservation of animal life, and of the *Nirvána*, or future state of rest, will be found to assimilate in these nations, and they all look forward to the advent of another and final appearance of *Buddha* upon earth. The Brahmins in a similar manner look forward to the accomplishment of the 9th and last *avatar* of *Vishnu*, viz. that of *Calci* who will appear, they say, for the destruction of all the impure with a cimeter like a blazing comet. The Buddhists of China believe *O-mi-to* (*Amida*) *Fuh* to have past, *Sheh-kea* (Sacya) *Fuh* to have last appeared, and *Me-lih Fuh* is yet to come.

It would not suit the limits I had set to this paper to enter into a critical examination of the differences existing in the metaphysics and external religious forms and observances of the Jainas of India and the Buddhists of Ceylon, the Indo-Chinese nations and China; suffice to observe that I consider them to have originally sprung from one source, and to express my conviction that a careful consideration of the various habits—the peculiar positions, geographical and political, the prior existing religions, and subsequent influential causes operating upon these nations, will serve in a great measure to account for the present variations. In all future researches into the dogmas of these sects, the *vivâ voce* evidence of the priests should be received with great caution, and checked by constant reference and comparison with that contained in their sacred books.

Ancient inscriptions should be collected and every precaution taken to secure *Buddha* MSS. free from Brahminical taint, written in the original *Pracrit* or *Páli*. A comparative view of Brahminical and Buddha chronology is still a desideratum. The genius of a Colebrooke itself was bewildered in the chaos of 2,000,000,000,000,000 oceans of years, contained in the *Avasarpini* and *Utsarpini* divisions of time.

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* As. Res. vol. IX. page 83.

II.—*On the Language, Manners, and Rites, of the* KHOONDS, *or* KHOI JATI, *of the Goomsoor Mountains; from documents furnished by* J. A. R. STEVENSON, ESQ. *Commissioner in Goomsoor, and* W. G. MAXWELL, ESQ., M. D.; *with Illustrative and connecting Observations. By* REVEREND W. TAYLOR, *Member of the Madras Literary Society, &c.*

Previous to any other observations it may be desirable to settle the true name of the people who have been designated Khoonds. In the title to Mr. Stevenson's paper on their customs they are styled కోదులు *Codulu*, and in Dr. Maxwell's list *K'hoi-jati.* If the orthography of the first written term be correct, as I presume it may be so considered, it must be a mistake to write the word Khoonds, intimating a transition through the Hindustani. The Telugu alphabet has a letter corresponding with *k'h*; but as it is not used in Mr. Stevenson's paper, the proper representative according to Sir W. Jones's orthographical system is *c.*; and as Dr. Maxwell only intends to give the sound, and probably made use of Hindustani as a medium of intercourse, his spelling does not necessarily militate against the same conclusion. The people I presume to be the same with those who have been otherwise termed *Goands*, usually classed as similar with the *B'heels.* There is besides a resemblance to the native term for the Coorg mountaineers, which is *Codugu;* and I am inclined to think, that any one who fully understood the Coorg dialect, could hold intercourse with the Khoonds. The insertion of the obscure nasal sound of *n* I may observe is no objection: it may be inserted or left out, in many Telugu words, and in some Tamil ones. *Codulu* is plural in Telugu, and *Codur*, would be the same in Tamil. If from deference to the usage, which has obtained, I use the term Khoonds, it is still improperly, and from a regard only to perspicuity.

The papers by Mr. Stevenson and Dr. Maxwell, in a loose and unarranged form, may, for order's sake, be classed under two heads, as relating to the language, and to the manners and rites, of this singular people.

On the language the vocabulary transmitted by Mr. Stevenson may be first inserted; because of the precision conveyed by the use of Telugu letters. The orthography by which they are represented is not systematic; but it may suffice. I am guided by the Telugu writing.

VOCABULARY.

	Khoond pronunciation in Teloogoo character.	
God	మహాప్రభూ	Mahaprabhoo
goddess	పెంన్నూ	pennoo
earth	టాంనా	taunah

water	కక్రై - సెద్రాజీ	kakary, sedrajee
name	పాదా	pautha
fire	టాణి	taunee
tree	మ్రుహాన్ను	mrahunnoo
village	నాజు	nauzoo
villages	నాసకా	nausakah
house	యిడ్డు	iddhoo
cows	కొడింగా	codingah
goat	వొడ్డంగా	voddungah
bullocks	బలదకొడ్డింగా	balatha koddinga
buffaloes	తల్లికోరు	tullekoroo
birds	పొట్టాగా	pottagah
animals	జొంతు	jontoo
tiger	క్రాడీ	kraudee
fowl	కొజు	cozoo
sheep	మెండా	mendah
mountain	సొరకా	sorakah
nullah or water course	జొడి	jodee
do. in plural	జొడింగా	jodingah
river	మోయీ	moyee
tank	బంద్దా	bundhah
paddy-field	కెత్తా	kettah
stone	బడ్డి	buddy
herds	కొడింగా	kodingah
man	లోకొ	loko

male	మ్రొనజు	mronajoo
female	అసమ్రిడ్డా	ausamriddah
child	మిడ్డా	middah
mother	అయ్యా	ayah
father	అబ్బా	abbah
daughter	బుడ్డి	booddee
son	మ్రాంజు - అపో	mrinjoo, aupoe
daughter-in-law	కుడువా - జహారి	coodoova, jahary
son-in-law	జామా	zaumah
husband		
wife	హ్రమావి	hramauvy
birth	గాడాజోనె ′	gaudajonay
life	నిబ్బామానె	nibbamanay
death	సాతె	sautay
marriage	బిహా	behah
gift	బిడ్డె	bidday
male-child	అపో	aupoe
female-child	అసామిడా	ausamiddah
big	ఠరారి	tharaury
how many	ఎస్సె	yessay
do you know	పుంజీ	poonjee
hallo	అడె	auday
head	త్లావు	tlavoo
hairs of the head	త్లావుత్లామలకా	tlauvootlamalaka
eyes	కనకా	canakah

ears	క్రీవు	creevoo
nose	ముంగ్గలు	moongaloo
mouth	సుడ్డా	sooddah
teeth	పటకా	patakah
chin	టొడ్డాళి - సొడ్డాంగ్గా	toddaly, soddaunga
tongue	బంగోశి	bangosee
cheeks	గడ్డాగ్గా	guddauggah
moustache	శిరికోరాంగ్గా	serekoraangah
throat	డొక్కా - శెరికి	docka, sareky
shoulder	కందా - కగ్గు	cunda, cuggoo
hand	కజ్జు - కక్కా	cuzzoo, cuckah
arm	బాహా - మొపొకుట్టా	bahah, mopokoottah
elbow	కొహొణి - గాటి	cohony, gauty
hand	ముడ్డా	muddah
finger	బసకాక - వొంగరి	basakaka, vonagary
nails	నొక్కొగ్గా	nockoggah
heart	మొన్నొ - జెడ్డా	monno-jeddah
breast chest	బుఖ్ఖు	bookhoo
belly	టూటూ	tootoo
navel	ఫుణెడ్డి	pooneddy
thigh	గొడ్డాగ్గా	goddauggah
calf of leg	సురడీ	sooradу
leg	కటకా	catakah
feet	పాదాగ్గా pavoo	padaggah pavoo
back	గండీ	gundee

buttocks	గిజ్జా	ghizzah
curry	కుసా	coosah
rice	బహా - పుల్లా	baha, pullah
afterwards	బతో	batoe
before	నోయితో	noyeto
one side	పక్కా	puckhah
above	శెండ్డోకి	sendoky
below	నెడ్డా	neddah
distant	ధూరా	dhoorah
dew	శరి	saree
falls	దీపికేమున్నె	theepekamunnay
so much	గుల్లె	goollay
paddy	కూడింగ్గా	coodingah
rice	ప్రాంగ్గా	praungah
paddy fields straw	పీరి	peeree
green gram, or pasaloo	మొగాగ్గా	mogaggah
Dholl or puppoo	జాయి	jayee
turmeric	శెనింగ్గా	seningah
salt	సారు	sauroo
tamarind	నెడ్డి	neddy
chillie	ప్రితకావు	pretakavoo
ghee	ఘిహీ	gheehee
oil	నిజ్జూ	nizzoo
castor oil	గబ్బాగ్గా	gubbauggah
milk	పాడ్డు	pauddoo

curds	ధోయిగ్గా	dhoyeggah
wey, buttermilk	గొల్లా	golloe
fish	మినకా	menakah
flesh	వుంగా	voongah
cloths	శిండ్డా	sindah
new	పూనారి	poonary
old	ప్రాడ్డారి	praddary
will you give	శియ్యాము	seyahmoo
take	వోము	vomoo
I will give	శియాయి	seyayee
I will take	వోయిమాయి	voyemayee
do not want	శిడ్డే - కోయి	sidday, coyay
I require	లోడాముంన్నై	lodamunnay
onions	ప్యాజుకా	peyazookah
garlic	లెసుణికా	lasooneekah
unripe	శిడ్డారి	siddaree
ripe	శైనతారీ	sanataree
young fruit	కొగ్గారి	coggaree
leaf	ఆకా	aukah
a bough	డెట్టి	dettee
bud, blossoms	కోమలాకా	comalakah
wind	బలీవు	belevoo
what	యింన్నా	innah
why	యింన్నాకి	innaky
will you come	బాయింజీగినా	bayinjeegeenah

come	బామూ	baumoo
are you going	సజీగినా	sajeegeenah
go	సలామూ	salamoo
don't go	కూనాసల్లా	coonasullah
be satisfied	సత్తాషామూ	suttashamoo
be happy	మంజాదుమూ	munjadoomoo
you will be ruined	బాసంగాడి	bausungaudy
it will be good for you	నెగ్గారాడి	neggaraudy
don't fear	అజ్జాఅ	azza-ah
weeping	డ్రీమంన్నె	dreemunnay
laughing	కక్కనారి	cuckanary
talk	కత్తాచెస్తాము	cuttachastamoo
eat	తినుమూ	tenoomoo
drink	వునుము	voonoomoo
good	నెగ్గారి	neggaree
not good	వొదాయితారి	vodauyetaury
ask	జామూ	jaumoo
tell	బసుమా	basoomah
I will tell	బశిపింజాయి	baseepinjayee
do you understand	పుశి	poosee
I understand	పుశె	poosay
collect in one place	రోబాతా	robatah
friend	తోనె	tonay
	Mitto	mitto
dark	అడ్డాంగ్గి	addaunghy

light	వుజ్జాడి	voozzady
break of day	బళాతా	balatah
night	నాడాంగ్గి	nadanghee
sun	బళా	balah
moon	దాంజు	daunjoo
stars	సుక్కాంగ్గా	soockaggah
morning	నాడి	naudee
midday	బెండ్డా	beudah
evening	బిల్లాడి	billadee
tomorrow	బెయు	beyay
day after tomorrow	మాయుశి	mauyesy
yesterday	రెయుశి	reyasy
day	నెంజు	nenzoo
month	ఆంజ్జో	aunjo
year	బొరసకా	borasakah
raining season	పిజ్జుదినా	pizzoodenah
cold season	పెన్నుదినా	pennadenah
hot season	కరాదినా	caradenah
plural	డెహా	dahah
singular	రొండ్డె	ronday
wax	శిత్తా	sittah
honey	పుక్కి	phoocky
maiming	కత్తనా	cattanah
fly	బీసా	beesah
one	రొండ్డె	ronday

twenty	కోడకాట్టూ	codacauttoo
hundred	సోయకా	soyakah
two hundred	రీసో	Reeso
thousand	అజారకా	Azarakah
two thousand	రీఅజారా	ree azarah
small	కోగారి	cogaury

The first word is Sanscrit, with a dialectic termination. It means *great chief*, *prince*, or *lord*, from *mahat* great and *prab'hu* a lord, &c. and is so used in, I believe, all the dialects of Southern India. The second word is Tamil simply for a *woman* or *female*, in ordinary acceptation. The word for earth, is one designating place or locality; and, derived from Sanscrit (if not adopted by it), runs through most of the Hindu languages, with dialectic variations. The word for fire, corresponds nearly with the Tamil தணல் *tanal*, great heat. The word for tree at first embarrassed me; but it is evidently only a dialectic variation of the Tamil மரம் *maram*, a tree. The word for village is the Tamil நாடு *nádu*, properly country as distinguished from town, sometimes denoting a district, and in use nearly synonimous with village: the difference of *du* and *zu*, is merely dialectic. The plural form *kah*, besides differing little from the Tamil plural, *kal*, is further a close resemblance to the mode in which the plural is enunciated in the extreme south. The word for house varies very little from the Tamil வீடு *védu*, denoting the same thing. The word for cow has in it the Sanscrit root *go*, or *gau*. The term for goat is like the Telugu వేఁట *venta*, a sheep or goat : it must I think be the same word. The word for birds, cutting off the plural termination, is the Telugu పెట్ట *petta* a bird. The next word for animal, is Sanscrit, Telugu, and Tamil, common I believe throughout India. For fowl the word is the Tamil, கோழி *corzi*, the Telugu letters expressing an imitation of the Tamil sound: the retaining this Tamil peculiarity is favourable to an inference as to the Tamil origin of the Khoonds. Mendah* for sheep is an intermediate sound between the Telugu వేఁట *vénta*, and the Tamil மந்தை *mantai*, the former signifying a *sheep*, the latter more properly a *flock*. The word for mountain, is, setting aside the *kah*, apparently the Tamil சுரும்பு *surumpu*, or of kindred origin. The term for river would seem to be only a dialectic variation of the Tamil நதி *nathi,* (*vulgò* nuddee, and nullah) a word which, coming from the Sanscrit, is found in all Hindu languages. The words for tank, stone, man, seem to come from the Hindustani, or possibly from the *Udiya* language of the province of Orissa. The word for mother is a slight variation from a Tamil word of like meaning, though now not much used. *Abba,* for father is found in Hebrew, Syriac, Telugu, Tamil, and in some of the dialects of the islands in the eastern archipelago; and is perhaps one of the most remarkable of all words. *Booddee* for daughter is the Sanscrit *putri,* slightly corrupted. *Aupoe* for son, is perhaps none other than the familiar domestic term of endearment அபபாவு *appavu,* only used in addressing a male-child. కుదువ *coodoova* is the Telugu word కోడలు *codalu,* a daughter-in-law. The word for son-in-law seems merely a corruption of the Sanscrit *jamalu,* having the same meaning. *Behah* is also a mere dialectic variation from the Sanscrit *vivaha* marriage. The word for male-child is the same as the above for son, and the word for female-child may be a corruption of the Sanscrit *átmajà,* a daughter. *Yessay* for how many, is, I think, originally the same with the Tamil எததனை *yettani,* of the same meaning; த் and ச் or t and s, are frequently interchangeable in Tamil as in பெரிது, பெரிசு great, பழது, பழசு old, சிறுது, சிறுசு small, in which case *s* is the more rude, and *t* the more refined. *Tlavoo,* seems also to be originally the same word with the Tamil word தலை *tali* head. The word for eyes is Tamil, with a slight difference in the plural termination, as before noticed. The word for ear in Sanscrit is *srava,* in Telugu, *sevata,* in Tamil *sevi,* in the Todar dialect of the Neilgherries *kevi,* in the Khoond dialect, *crivu,* in Tamil the word *hearing* is கேள்வி *kelvi,* shewing that *s* is changeable into k, as is indeed the case with some other words. The natural conclusion is, that the whole of these words are dialectic variations from the Sanscrit *srava*; or conversely that the Sanscrit word was adopted from a common root; but I would not assert either conclusion. The word for nose is in Tamil மூக்கு *múccu,* or Telugu ముక్కు *muccu.* For teeth the Tamil word is பர்கள் *parcal,* differing very little from the Khoond word. The Todars of the Neilgherries I am informed use the sound பர்சச் *parch,* for tooth. The word for throat, *docka,* is used in Tamil to signify any hollow of a tube or pipe. The first of the two words for shoulder is the Sanacrit *scand'ha* having the same meaning; and in Tamil, words from the Sanscrit, with the initial letters *sc*, usually lose the *s*, by which process the word would become *cand'ha*, or *canda*, as in the Khoond dialect. The word for hand seems to come from the very old Tamil *kayi* கய், the modern spelling being கை *kai*. The ய் by no unusual process is changed into சு *chu*, whence the Khoond word *cuzzoo*, or as I should spell it *cajju*. The word *behah*, is Sanscrit *báhu* the arm. The word for nails differs only slightly in its plural form (as before) from the Tamil நகஙகள *nacangal*, of the same meaning. The two words for heart, are, I doubt not, the same with மனம and சித்தம *manam*, and *sittam*, usually denoting the *mind* and *will*, but used interchangeably with இருதயம *irutayam*, *heart*, in the sense of will or inclination. *Padaggah* is only the Khoond plural added to the Sanscrit *pata* and Tamil பாதம *patam*, a foot. *Gundee* for the back is I believe the Tamil குண்டி *gundi*, the lower part of the back. The word for afterwards is probably Hindustani. The word for distant comes from the Sanscrit, and is common to all *Hindu* languages. In Tamil பிரி *piri*, and புரி *puri*, are used for a straw rope, and I doubt not that the same is meant by the Khoond, *peeree*. *Sauroo* for salt, is from the Sanscrit, *cshara*. In Tamil the word is usually combined with the common word for salt, to express the flavor or relish of salt. The word for chillie, differs only very slightly from the Telugu word for the same. *Nizzoo* is only the Tamil word நெய் *neyi*, the ய changed (as before) into *chu*, making *nejju*; but this in Tamil signifies ghee, or butter-oil. The word for fish, cutting off the Khoond plural, is the Sanscrit *mín* and Tamil மீன் *mín*. *Poonary* for *new*, seems to be an antique word, preserved here and in the Tamil புனிறு *punirru*, the Tamil word being now only applied to the new birth from a cow. The word for old may have a connexion with the Tamil, but the resemblance is obscure. The word for garlic is Sanscrit, *lasuna*. *Aukah* for leaf is Telugu, అకు *acu*. The word for bud, blossoms, rejecting the Khoond plural, is Tamil குமிழி *cumili*, a bud. *Innah* for *what*, is the Tamil என்ன *yenna*, what? *Innaky*, for *why* is seemingly the Tamil என்னத்துக்கு *yennattuku* to what, why? In the phrase for *will you come?* the root of the verb *to come*, and the interrogating particle are both Tamil: the Tamil root is also found in the Khoond word *baumoo*, *come*. Salamoo, cutting off the Khoond termination, is

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* The *h* in this, or in the other words is not in the Telugu characters but simply long á as found in the word *after*.

Sanscrit *sala*, to move, to go, it is corrupted both into Hindustani and Tamil. The word for don't fear seems to bear a relation to the Tamil அஞ்சாதே *anjaté*. The word for laughing is preserved in the Tamil phrase கக்கக்கென்றுசி ரிக்கிறான் he laughs uttering *cacac*, in the Telugu కక్కనావు *cacacnavu*, is a rude, or horse laugh; and a resemblance is also found in our common English, to *chuckle*. The phrase for talk is half Hindustani, half Telugu. *Tenoomoo* for *eat*, in the Tamil தின்னு *tinnu*, with the Khoond termination. *Voonoomoo* in like manner is the Tamil உண்ணு *unnu*, *eat* or *drink*. The word for tell is Telugu. *Tonay* for friend, is the Tamil துணை *tunai*, a friend, a prop. The other word is Sanscrit *mitra*,* a friend, it is adopted into Tamil, but most usually to signify treacherous friendship. The words for light, and break of day, have only an obscure resemblance to Tamil words of like meaning. For *night*, the word resembles the Tamil நத்தம் *nattam*, *night*. The word for stars rejecting the Khoond plural is Telugu సుక్క *succu* a star. The word for morning seems the same as the Telugu, నాడు *nadu* a day. *Borasaka*, for *year*, or, as I suppose, for *years* is no doubt, the Tamil வருஷம் *varusham*, a year. The three following words, for *hot*, *cold*, and *rainy season* seem to come from the Hindustani: the same remark applies to the word for *maiming*. The word for *hundred* seems to be a corruption of the Sanscrit word, that for *thousand* is I think the same as the Tamil ஆயிரம் *ayiram*, and for *two thousand*, a sort of bad pronunciation of the Tamil ஈராயிரம் *irayiram*, two thousand.

Such is the result of an investigation of the list of words, transmitted by Mr. Stevenson, expressly made the more minute, because both of the precision and check afforded by being written in Telugu characters: without these I should not have been able to give the words their proper enunciation, as the English orthography is not systematic and therefore uncertain. It must, however, be remembered that even the Telugu only gives the sound as conveyed to the ears of a comparative foreigner; though more likely to catch the true sound than an English ear. I suppose the mountaineers in question to have no written language.

From what has been stated, conclusions might be ventured; but it may be best to bring in further examples. The vocabulary of Dr. Maxwell has a somewhat larger number of words and phrases. It was accompanied by the following letter:

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* It would have been desirable to give the Sanscrit in the original *Dévanágari* characters, in the same way as the Tamil and Telugu characters are given. They were written in the copy; but omitted, I presume, through a want of that kind of type.
W. T.

To The Secretary to the Madras Literary Society.
&c. &c. &c.

Sir,—Any thing connected with the history of the tribes above the Goomsoor ranges of mountains, being interesting at the present moment, I beg to send you a list of Khond (or Ghond) words, which I collected whilst up there.

The Wodiah, I have also put down, which will render the list more interesting, and enable those, better qualified than myself, to make useful comparisons. To those passing through Wodiana into Khondistan this little list may also be of some service. I have only to regret that I cannot send you a more extended one.

I have the honor to be,
Sir,
Your obedient servant,
Samulcottah, *March* 15, 1837. W. G. Maxwell, m. d.

The Vocabulary is the following one :—

English.	*Woadiah.*	*Khond.*
one	ekke	ekke
two	douc	doue
three	tine	tine
four	chare	chare
five	panch	panchu
six	chau	sau
seven	sat	sathu
eight	ath	athu
nine	nau	nau
ten	dos	dosu
eleven	egarah	egara
twelve	barah	baarah
thirteen	terah	terah
fourteen	chaudah	saudah
fifteen	pundarah	pundarah
sixteen	solah	solah
seventeen	satarah	sataarah
eighteen	atarah	ataarah
nineteen	unis	unisi
twenty	kody	koze
a man	manusha	jama
woman	maikinya	asamida
boy	pua	apo
girl	ghia	bude
father	boppa	aba

mother	ma	aya
grandfather	bodda boppa	akenja
grandmother	bodda ma	atha
grandfather, mother's side	wodja	akey
elder brother	nunna	dada
younger brother	sana bhai	apo
elder sister	nanni	bhai
younger sister	bhouni	budi
what is your name?	tuora naum kiso	anni padatatti inu
where is your village?	toura gau koture utchi	mi naju embam anni
come early in the morning	boddu soccale aso	daasay vam *or* bam
how far is your village?	tuora gau kete door utchee	mi naju esse duro
my village is ten coss	humara gau dos kos utchee	mai naju dos kossu ane
how far is Patlingeah?	Patlinga kete dur utchi	Patlingaki essse dur ane
have you cooked food?	bhatta randuloki	veyha vasiti ginnaa
have you eat food?	bhatta khailoki	veyha tisi ginnaa
how many seers of rice did you eat?	kete ser chaulo bhatto khailo	pranga esse adiah tinge
I eat three seers of rice	tin ser chaulo bhatto khailu	tin adiah veyha tiee
do you eat meat?	Maunsa khailoki	inu onga tinji ginnaa
what meat will you eat?	tu ki maunsa khaibo	ani onga tinji
I will eat mutton	cheli maunsa khaibu	odu onga anu tiee
I will eat fowl	kukuda maunsa khaibu	kodju ongha tiee
I will eat fish	matcho khaibu	minu anu tiee
I will eat dry fish	sukwa matcho khaibu	nore minu tiee
I will eat pig's flesh	gusri maunsa khaibu	anu paji onga tiee
who is your God?	tumara kau Deybota	mindi anni peynu
what is his name?	tumara Deybota namo kiso	mi peynu anni peynu
how many gods have you?	tumara kete Deybota utchi	mi peynu esse peynu munne
Takurani is the greatest of all	samos teko bodda takurani	gulletiki dumalurri durani
how do you pray to the God?	ki mante Deybota puja korocho	peynuki singhi lakideru
what is the name of this month?	ye masuro namo kiso	iree anni danju
February	Mhago	Keydu
how many people do you sacrifice in one month?	gute masure kete manuso katuso	oro danju esso anni mirimmi pakidirru
amongst the khonds how many castes?	khondare kete jati utchi	khoi jati esse jati munney

maliks	maliko	maliko
toddy dealers		sundee
cattle dealers		gouro
smiths		shouro
potters		comboro
basket-makers		dambo
weavers		panu
do you kill the women in your country ?	tumara gau re maikina ko mari pakawucha	mi naju tarrani asamidani pakadirganaa
yes they kill any person they can get	je milibo lukku marachu	esso anni paneru e anni paginirru
before killing how long are they kept ?	kariba agere ketedin rakucho	paginne veline esso dinno raigadirru
no time is fixed	ko dinno tikkana nein	denno tikna ate
in this month they sacrifice	ye masure sonki katucho	edanju marimmi paginirru
fire	nia	nari
ashes	karo	nari niju
charcoal	ongharo	1. nari sirovi 2. ongaranga
jungle	bono	gossa
tree	gotza	mhranu
chatty		tikki
dammer		saddali
fan	bichana	bichane
sun	korra	karra
moon	junno	danju
star	torra	sukkanga
cloud	megho	mudeng
rain	barrosa	piju
word, speech	kotha	katta
head	munda	tulao
nose	nakko	mungeli
mouth	sudda	suddo
lip upper		todde
lip lower		rapaddi
teeth	dant	patka
hair	bala	tala merka
breast	bukko	dukhi
belly	pettau	tutu
hand	katau	kadju
finger	angoti	vanju
nail	nakkau	ongoli
thumb	bodda angoti	darra vanju
foot	gaddu	kadu guttasi

knee	anthu	menda
leg	punda	pottu
eye	ankhi	kannu
ear	kanno	kirru
tongue	jibbo	wangosy
earth	matti	virra
stone	patro	vaddi
water	pani	1. sideru 2. sideruji
milk	palu	padu
salt	nuno	saru
leather	chummo	(gooroo) panda
battle-axe	tangi	tangi
cloth	lugga	sinda
brass-goglet		pida muta
marking-nut		gonje
gooseberry	aumla	zarga kanga
saber bean	chary gotza (tree)	pa erri (fruit)
horse	ghorra	ghora
leaf	puttera	akka
(mountain) indigo		vareda
beans of		vareyda guzerka
flowers of		vareyda poongha
I eat the flowers of M. I.		vareda poongha tinum
tree (bark of)		terasu mhranu
burra gotza	bodda gotza	darri mhranu
burra dez	bodda dez	muta khonda
what language do you speak ?	ki kotha koucho	anni katta vespimanjari
dubash	dobashi	dubassa
what business is the dubash's ?	dobashi ki, ki peyti wutchi	dubassa anni kabbari giajinaru
who went there now ?	yebbe kese golla ci battere	i pari imbai sajjumunni
what did you do with the cloth ?	ce lugga kaunokollo	e sinda anna gitti
I gave it to my wife to put on	humaro bhajoki pindibako dellu	mai kura nagulaimunni site tatite
give a seer of rice to that man	ce manusho ko sere chaulo de	e manaheniki pranga ade ka site
give a seer of rice to that woman	ce maikana ko sere chaula de	e asamida ade ka pranga sidu
give a seer of toor to that horse	ce ghorra ko sere khandulo de	e ghoratiki khanga ade ka sidoo

how many wives do the khonds take?	khond jattire gutte jonon ke lutta vivaha utchi	koi jattiki esso unni vengha teru
do you smoke tobacco?	tu dhua khao chuki	inu dhua undiginaa
do you eat tobacco?	tu dhua tondere pakka utchi ki	inu dhua tinjiginaa
bring fire	nia ano	1. tammare nari 2. nari tummu
bring food	bhatta ano	tammare veyha
bring paddy	dhanno ano	tammare kodinga
bring rice	chaulo ano	pranga tammu
take away the fire	nia ne	nari om
take away the rice	bhatto ne	veyha om
take away the paddy	dhanno ne	kodinga om
father take away the paddy		kodinga ommare aba
bring the horse	ghorra ano	ghora tammu
bring the goat	cheli ano	oda tammu
kill the goat	cheli maru pukka	oda kattam
a kid	cheli pilla	oda mida
bring the cow	gai ano	koudi tammu
bring the calf	damri ano	dradu tammu
house	ghorre	iddu
is there any fire in your house?	tumara ghorre bihtere nia watchiki	mi idduta nari munneginnaa
is there water in your house?	tumara ghorre bihtere pani watchiki	mi idduta sideruji munneginnaa
how many people in your house?	tumara ghorre kete jonon watchinti	mi idduta esse loku maneru
who cuts the wood to build the houses?	ghorre bandibako katho ke dowatchi	iddu gariki vattiki vesca imbasianne
all the villagers cut	sub gaun lokko katti annile	gulle najutakka vesca kattinerru
what wood is that plank?	ce potta ki kotha	erri anne vesgu patta
mangoe	ambo katho	mha vesca patta
how many planks are got from one large mangoe tree?	gutte ambo gotzeru kete potta barivo	erande mhranu essoni putta anu
two	Jure	joreka
terminalia bellerica fruit of		bare khanga
leaves of		bare aka
tree		bare mhranu
kernel		bare monzo
stone		bare palla
people eat the dry kernel		monzo gulla takka tinum
burra sahib		darre saib

maharaja		maparu maharaja raju
queen		mhade
toddy tree	sollupu gotza	sorta mhranu
comb	kangai or punya	sireni
go to that village and call a man	ce gaun ko jaikare gotte monushu ko dakiano	e naju sajane arkamu mauheni ern anni arkam
will you go to Berhampore?	tu Berhamporko jiboki	inu Berhamporko sajiginaa
I will go	mu jibi	ana sagimai
I will come to-morrow morning	succalu asibi	daase vai
grass	ghasso	solah
long grass	nhoda	judah solah
basket	takkei	bogah
dammer tree	loringhi gotza	zirgi mhranu
dammer flowers		zirgi poongha
red	lall	inghu
black	kolla	kali
white	dhoba	longi
yellow	holidia	siningha
chair	kursi	(no name)
bow	kando banso	viddu
kheli bow		kheli viddu
bamboo-bow		mari viddu
bow-string	gunno	viddu wessa
arrow	sorro	miliu
point		gouri mouari
barb	sorro charo	gouri kora
binding	loi	goha
notch	gunno jugga	tauni
feather	phonkhi	katka
quill	phonkhi	kedu
I am coming	mu asowatchi	anu idde vai
I am going	mu jaowatchi	anu sajimai
he is going	ce jaowatchi	yanjhu sajimunni
he is coming	ce asowatchi	yanjhu vai munni
we are coming	hum asowatchu	amu vanam
you are coming	tum asowatchu	eru vadu
they are coming	ye asowatchi	vaimanenju
I will go	mu jibi	anu sagimai
he will go	ce jibu	yanjhu sajimunni
we will go	hamen jibbu	amu sagimunnam
spirits	modda	kallu

they make toddy from the *Erpatree* flowers, &c.*	moulo gotzere teiaro koriba modda	erpi phoungha mhranuta kallu teiari gia manju
they put (the flowers and fruit ground small) into water for four or five days—and then boil—and then take off the spirit	(phullo phallo) chari panchi dini panire bottere rukhibo tein potche randibo tein potche moddo karibo	char panch din sideruji itininju dau vajininni dau kallu eheneju
what is the use of the kissi tree?	kissi gotza ki peyti ki asowathci	kissi mhranu anni veygierru
we use the bark to make strings	lohi douri paia noutchu	amu nossu doruki vattiki onuin†

After making out the list of words and questions, I took every opportunity of interrogating any Khond whom I met, and it was amusing to see his astonishment when I spoke to him.

On returning to the low country the only Khonds I met with, were some young children that had been preserved from sacrifice by the Collector. To one of these I addressed myself, asking his name in Khonds; speaking fast, at first he did not understand me, but on pronouncing more slowly and distinctly, he instantly called out his name.

In the preceding vocabulary the numerals are derived from the Sanscrit: the Tamil numerals are quite different. Some few of the words have been explained in Mr. Stevenson's list. In the rest there is a tolerable sprinkling of words, which are synonimous with Telugu or Tamil words. The *Udiya* dialect is seen at a glance, to be derived from the *Mágadha*, or Bengal and Bahar dialects, if not from the Hindustani, to which it has a frequent resemblance, sometimes amounting to identity. But I look upon the *Udiya* (or Wodiah) to be more modern than the Khoond speech. The word for milk may be noted as being in Udiya, the same as in Telugu, and nearly the same as in Tamil, while *Pádú*, as the Khoonds have it, shews a variation, which would give a different sense in Tamil; and yet it is probable that the word in all three dialects is originally the same. It will not perhaps be expected, and I know not that it would answer any really valuable object, to pursue as minute an examination with this list as with that of Mr. Stevenson. It may suffice to say that the same general result is indicated; which is, that the Khoonds have words peculiar to themselves, and others which are found in the low-land languages of the peninsula.

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* *Bassia longifolia.*

† The diacritical vowel-marks employed by Dr. Maxwell are omitted in the printing, and by consequence his glossary of them; probably from the want of types with such marks. This explanation is given that Dr. M. may not consider his directions to be neglected.
W. T.

Before proceeding I must premise, for the information of some readers, that it has been a question among learned Orientalists, whether the refined Sanscrit was the parent of the common Hindi, the latter being a corruption, or whether the Hindi formed the basis or substratum of a common Indian language, adopted by the *Brahmans* on their entry into Hindustan, but polished by improvements and enriched by the addition of scientific and other terms, especially astrological ones, brought with them on their emigration. Perhaps from acquired partiality to the Sanscrit, there has been, with scholars in that language, a tendency to adopt the first supposition, just as there was with the same individuals a disposition to consider Telugu and Tamil as derived languages from the Sanscrit. But the erroneous character of this last deduction, reflects a doubt on the other part of the supposition as regards the *Hindi*; and I confess that when reading Mr. Colebrooke, in particular, the proof which he brought to bear in favour of Sanscrit being the original, and *Hindi* the derivative, produced in my own mind a strong doubt on that side of the question; while his admission of existing difficulties as insuperable on that hypothesis seemed to me to argue in favour of *Hindi* being the parent, and Sanscrit the polished, improved, and enriched, derivative. The very meaning of the term Sanscrit, implying *finished, polished, perfected,* argues towards the same conclusion. Even so our present polished English language, must be considered as founded on the Saxon; it would be absurd for any foreigner to term the old Saxon an early corruption of the original polished English. That view of the case which considers the Sanscrit to be a learned refinement on ruder dialects, if correct, leads to connection with another opinion, one that is likely to have strengthening evidence constantly added to it, which is, that there was one original *substratum* of an early and rude language, running through the whole of *Hindustan* and the peninsula; broken by time and distance into local dialects, which however still retain a strong affinity with each other. Such being supposed to be the case, is the Khoond dialect a relic of that common language, somewhat modified by time? or has it been made up by intercourse with people speaking the different languages, that have been discovered to exist, as if naturalised in the Khoond dialect? I am not able to determine either way; but, with some allowance for the latter source, in some cases, I incline rather towards the former view of the subject. I have read in some publication, concerning the Khoonds, that they have among them a tradition of having emigrated from the south, and from some mountain termed by them *Dodah.* This was the cause of my conjecturing some connexion with the mountaineers of the Neilgherries, whose highest mountain is *Dodabet*, and whose chief people are the *Todars.* The comparison* of language however, so far as I have been able to effect it, has not much assisted any such conclusion. The Khoonds have words which are of antique, pure, and high Tamil; such words are favourable to an ancient origin of their tongue. If at an early period they were driven to take refuge in mountain-fastnesses, by reason of nomadic hordes of foreigners taking possession of the low-lands, then they might very probably carry with them the ancient general dialect of the low country. I have some reasons for such an opinion, founded on documents not yet before the public; but the most I can here do is to throw out the question for further consideration and investigation.

The second topic of attention is the manners, and rites, of this singular people. A brief extract from Mr. Stevenson's letter to the Editor of this Journal may perhaps best introduce this part of the subject.

"I must quite give up all hopes of being able to compile anything connected with the Khonds, &c. I have in vain attempted to find time to translate the enclosed memorandum, which are answers to queries put from time to time by me: you will have no difficulty in getting them translated,and if worth anything they can be made use of— the small *Vocabulary* is, I think correct—the account of the Merria or human sacrifice is also correct—but this I gave to Mr. Russell with a request that if he did not wish to incorporate it in his Report he would send it to you. If you think it worth while you might procure his consent to publishing it—to which, as he has finished his report, he would not probably object. The form of oath in their own language is curious and striking—these notes may assist you, or others who have collected materials, in drawing up a short memoir."

The memorandum to which Mr. Stevenson alludes, is a Telugu paper, rather in a Cutcherry hand-writing. It illustrates some ot the curious peculiarities of the Khoonds. I have made with some care, and here present the following

(TRANSLATION).

The customs of the race of people called Codulu.

1. *The mode of celebrating marriages.*—Some of the relatives of

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* After the above had been forwarded to the Editor of this Journal, that gentleman was so kind as to send me the first part of a Vocabulary by Reverend B. Schmid of the language of the Todars and Burghers (or rather *Vadagars*) of the Neilgherries. The perusal did not add much to resemblances of the Khoond dialect, but the materials on either hand are not full. The Todar language has some few Tamil roots, the Burgher dialect is full of Tamil words. The Todar dialect indicates great antiquity, and derivation, I am almost positive, from the Canarese, probably Hala Kanada.—The speech of the Vadagars (or northerns ?) is much more modern—that word at Madras designates the people of Telingana; but being merely a relative term, it may have been used to designate a people who emigrated from some district, or country, north only of the Neilgherries. W. T.

the intended bridegroom, go to the house of the future bride, and ask if it be agreeable to give their daughter in marriage to the person indicated. If agreeable to the latter persons, they signify their consent; and they give a she-buffalo to the persons who came to make the demand. On the road back, they kill this animal, slightly roast it, and eat it. The following day the people of the intended bride's family go to see the purposed bridegroom: on which occasion the relatives of the latter shew every thing contained in their dwelling, or possession, to the visitors. Whatsoever these find to be valuable, be it a cow, or any thing else, they desire that it may be given to them; and they receive a promise that it shall be given, though it is not allowable then to receive and take it away: they feast on ardent spirits and flesh, and then depart. The next day the relatives of the man, call together a few other people; and the whole proceed, carrying the cow, and other things, to be given as requested. The people of the woman's family kill a number of buffaloes, proportioned to the visitors; on half the flesh of which the whole feast together, while the other half is carried back by the visitors, and made to feast all their relatives. Another time, the man's relatives proceed to the other house, and give them a formal invitation. On the female's relatives going accordingly, the people of the man's house kill buffaloes, eating one half together, and giving the other half, with rice, to the visitors, who carry the same back, and with it feast their relations.

Subsequently, the mother and father of the man, go to the other house, and ask when it will be agreeable to the female's relatives, that they should come to escort the female; and when any day whatsoever* is fixed upon, the precise place where the parties are to meet is specified. At this visit free use is made of spirits and flesh, before the visitors depart.

On the appointed day, mats† are laid down for the bride to walk over, and spreading a mat over her for the sake of shade, they give to her all needful household stuff, or utensils; and, accompanied by a crowd of men and women, they go a short distance in procession to the place previously indicated. The mother, father, and relatives of the man, remain previously a little farther off. The people of the female convoy, call out to the others to come and fetch the bride; and then a mock fight, with stones and thorny brambles, is begun by the female convoy against the parties composing the other one. In the midst of the beating, the assaulted party take possession of the bride, and all the furniture brought with her; and carry all off together. The female's relatives return from that place to their dwelling. The day following this transaction the man's relatives locate the female, and the furniture brought with her in the inner open court of their house. Subsequently placing her on a stool, they pour water over her head in bathing. Beneath this stool, the younger sisters or younger brothers of the bridegroom are concealed; and the water flows down over them. They take occasion, during the bathing, to snatch off the ring, from the bridegroom's finger. On her asking to receive back her ring, they strip off from one of themselves some valuable ornament, and give it to her, retaining the ring. Soon after, their hierophant (*Jáni*) comes bringing with him a cord,* a turmeric rod, also a nut of the tree *mesua ferrea*, which he strings upon the cord, and taking these things together with the bride and bridegroom only, he goes into the woods, where a hut, made only of sticks has been before prepared, in which being seated, the *Jáni* wishes them both health and domestic prosperity, and ties the cords* on the neck of each one. Afterwards they return to the house. Hogs and other animals are killed, and liquors brought, when they prepare *báji* (supposed from the use of the word in another place to be a sort of olio, or mixed dish) and all partake of it. From this day forward, the parties are considered to be man and wife. They beat on drums; they give to the *Jáni*, rice, flesh, and liquor, and send him away.

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* A negligence of auspicious, or inauspicious, days (according to *Hindu* notions) is implied by the Hindu writer of the original paper.

† The Hindus have a similar custom at their *funerals*, only they spread cloths instead of mats.

2. *The ceremonies attendant on the birth of a child.*—As soon as a child is born, they follow the ancient custom (not explained). For a month after the birth the mother does not eat out of the household vessels. On the day which completes the month, they kill some animal, and prepare the flesh, they also procure liquor, and make *báji*. The victuals is cooked by the mother of the child. They pour a small quantity of liquor out upon the ground (as a libation) saying, "O beneficent goddess! preserve the child." They then distribute portions of prepared food and *curries* to the houses of their various relations. Those immediately belonging to the house, consume as much liquor as they please, and make *báji*; (here the word seems to denote a riotous banquet, or a feast).

Six months after, on a fixed day, they make *Gáduthuvà* (supposed to mean the same as *Námacarma*, or ceremony of naming the child). On that day killing a hog, and procuring liquor, they make *báji*. They wash the feet of the child. The *Jáni* being come, he ties a cord from the haft to the point of a sickle; they divine by means of it. Having assembled the *Petrilu* (literally ancestors, but here denoting household images, or gods) they put rice on the sickle. As the names (of the ancestors? or family?) are repeated in order, each time the rice is put on, that name is chosen on the mention of which the sickle moves, and is given to the child. They then drink liquors, and eat *báji*. They give rice and flesh to the *Jáni*.

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* The original is followed; the composition of which is not very exact in the use of singular and plural.

When two years are elapsed, they cut off the child's hair, and on that occasion, killing some animal, and procuring liquor, they make *báji*.

3. *The ceremonies customary at funerals.*—On the life ceasing, they tie a sheep to the foot of the corpse. They carry the clothes, brass eating-dish, brass drinking-vessel, ornaments, grain in store, and the said sheep, all together to the burning-ground. Having burned the body, and gone round about the pile, they leave all those things there, and beating drums, return home. Those garments the *Pánó*[*] take away. They procure liquor, and drink it. They then go to their respective houses and eat. On the next day, they kill a she-buffalo, and get together a great quantity of liquor. The whole of the tribe (near and distant relations) being assembled, they make *báji*, and eat: they beat the drum (or drums). If the deceased were of any consequence, dancers come, and dance to the sound of their drums; to whom some animal is given, which they take and go away. Subsequently on the twelfth-day, they carry a hog to the spot where the body was burned; and after perambulating the site of the pyre, return to their home; where they kill the hog in the place set apart for their household gods; and procuring liquor, they make *báji*; the members of the tribe eating together.

4. *Case of death by a tiger.*—Should a tiger carry off any one, they throw out of doors all the (preserved) flesh belonging to him, and all the people of the village, not excepting children, quit their homes. The *Jáni* being come, with two rods of the *tummíca* tree (*Tamil—Véla maram*) he plants these in the earth; and then bringing one rod of the *Conda-támara* tree, he places it transversely across the other two. The *Jáni*, performing some incantation, sprinkles water on them. Beginning with the children, as these and the people pass through the passage so formed, the *Jáni* sprinkles water on them all. Afterwards the whole of them go to their houses, without looking behind them.

5. (*Degraded occupations*).—The *Mangili* (barber) *Páno*, *Hadi*, *Dandási*, these castes, being excepted, the *Codulu* people eat with all the other tribes.

6. (*Treatment of Brahmans*).—The *Codulu* people do not pardon the *Brahmans* (or show them favour beyond others).

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[*] Weavers.—Dr. Maxwell's vocabulary.

7. *The castes* (or tribes) *of the Mountaineers.*

1. Codulu
2. Páno
3. Hadi
4. Chittra
5. Lóhárá
6. Gunnà
7. Gaudd'ha
8. Cumari (potters)
9. Sudbà
10. Gauda
11. Tòmla
12. C'hadbà
13. Cheduvà
14. Vódià
15. B'hadálà
16. Béniyà
17. Vómayattá
18. Sodi.

These tribes are in the mountains.

8. *The gods honoured by the Codulu people.*—1. Dherma dévata. 2. Savuri-pennuga, a forest-goddess. 3. Jácari-pennuga, a local goddess. 4. Járápennu, so called a *Linga dévata*, which is their favorite deity. 5. Jurachi-pennuga, the god or goddess of rain. 6. Tada-pennuga, the earth-goddess.

9. *The manner of worshipping these deities:* 1. If occasion arise to present any offering to *Dherma-devata*, they take inferior rice and mingling turmeric with it, they hold it up, and worship.

2. To *Savuri-pennuga*, the so-called forest deity, when the corn flourishes, they bring liquor, fowls, rice, and roasting the fowl, they cause worship (*puja*) to be made by the *Jani*, and preparing *bájî* they eat.

3. To represent *Jacari-pennuga*, the local deity, they fix three or four stones, and near to these (representatives) they place dressed dolls, artificial figures of birds on sticks. On the beginning of any thing, or affair, or any particular occasion, they call for the *Jani* and slaying fowls and hogs, they bring liquor and making *baji*, eat.

4. To represent *Jara-pennu*, the *Linga-daveta* or the *Petri-devata*, they make, in brass, figures of elephants, peacocks, dolls, fishes, these and the like, and keep them in their houses. If affliction happen to any one belonging to the household, or if the country cutaneous eruptions break out on any of them, or if the anniversary of an ancestor's death occur, they put rice into milk, and mingling turmeric with it, they sprinkle the mixture on those images, and killing fowls and sheep, they cause worship to be made by the *Jani*; and, making *baji*, eat.

5. For *Jurachi-pennu* the rain-deity, if there be no rain, they kill a sheep beneath a tree, and causing worship (*puja*) to be made by the *Jani*, they cook half the flesh for the *Jani*, and cause him to eat, and the other half they divide among themselves.

6. To *Tádá*, the *B'hu-devata*, or deity of the earth, they make the *merria*-sacrifice, or offering. This *puja* having been finished, they give from one to three pecks (*tumu* or *maracal*) of grain, rice, a fowl, a sheep, (or fowls and sheep) to the *Jani* (or sacrificer).

I may add as regards the name adverted to at the commencement of this digest, that the hand writing sometimes leaves it uncertain whether the word by which they are designated should be *Cádulu*, or *Codulu*, but from the way in which the ɤ is sometimes written, I think it is not meant to be introduced into the word, which is I believe *Codalu ;* but I make the remark that I may not wilfully lead into error. I am not sure if the she-buffalo often mentioned may not be a cow; which, however, a Hindu would not like to acknowledge. As to the term *Baji* it is to me unintelligible. But I think the term may receive some illustration from a passage which I extract from an account of a visit to the Raj-mehal hills near Bhaugulpore in Upper Hindustan. It is the following :

" At 11 A. M. we set off to visit the neighbouring villages. On reaching the former (Dundah-goddah) we found the inhabitants of both villages assembled for pooja and drinking.—Nearly all the people, to the amount of at least 100, were in a state of intoxication. The noise of the drums, cymbals and singing almost prevented us from hearing our own voices. We witnessed the Pooja which had just commenced, —a fowl and a pig were sacrificed, and a part of the blood of the latter, mixed with cooked grain and tuddee, drank by the Daimno." It is this last preparation which seems to me to harmonize with the way in which *Báji* is spoken of sometimes as a compound-food, sometimes as a feast. I may remark that I have met with the above extract since making the translation, consequently this was in no way influenced thereby. The *Daimno* of the Raj-mehal people is apparently the *Jani* of the Khoonds, and it seems to me that there is a close similarity between the customs of the two sets of mountaineers. Several coincidences appear in the account whence the above extract is made. I have otherwise heard that the hill people of Raj-mehal speak a language like Tamil. The name for village in the above extract *goddah*, or *gudi*, is perfectly common in the south, and in parts of Mysore. Any similarity of languages between insulated localities, so distant from each other, argues in favour of an early general language throughout India.

In the translated paper there are some things that appear otherwise curious, as the pouring out libations, a custom so familiar to the classic scholar ; and an almost universal custom of heathen antiquity. The placing sticks and causing people to pass under, or through them, reminds one of the *Furca* of the Romans ; though the import of the act in either case differs. However not to dwell on such things, nor on resemblances to customs heretofore among the South-sea-islanders, we may advance to that sacrifice which is briefly alluded to at the close, the *merria* sacrifice, on that of a human victim. This custom also preailed in the South-sea islands; and I cannot think that the many resemblances are perfectly accidental.

Of the *Merria* or human sacrifices, the following has been forwarded by Mr. Stevenson, alluded to in the extract from his letter :—

Memorandum regarding Human Sacrifices among the Khoonds.—The sacrifice is offered to Thadha deveta (the earth), under the ffigy of a bird. It is offered annually to propitiate the deity to grant avourable crops and seasons. The ceremony is performed at the expense, in rotation, of certain Mootas composing a circle, and connected ogether from local circumstances. It is impossible to ascertain the number of places in which the annual sacrifices take place, but they re very numerous. Besides the annual sacrifice, human victims are ffered up by Mootas, or by individuals, to avert any threatening calamity arising from sickness, murrain, or other causes. The victims may be of any caste, or sex, or age; (I have not however heard of an instance of Khonds being sacrificed): but grown males are the most esteemed, because the most costly. Children are purchased, and reared for years with the family of the person who ultimately devotes them to sacrifice, when circumstances demand a victim from him. They appear to be treated with every kindness, and, if too young to be conscious of their fate, are under no constraint—otherwise they are kept in fetters and guarded. There appears to be no difficulty in procuring victims; most of those that have been rescued were sold by their parents or nearest relatives, and this appears a very common practice. Persons of riper age are kidnapped, and there are individuals who follow a trade in human flesh, and supply victims by kidnapping or forcibly seizing children. The Khonds never sacrifice a criminal, or a prisoner captured in war. It must always be purchased—the price paid is from 60 to 200 Rupees, and the price is paid either in brass vessels, cattle, or coin, or partly in each.

The Janee or priest (who may be of any caste) officiates at the sacrifice, but he performs the *pooja* offering of incense, flowers, &c. to the idol, through the medium of the Toomba, who must be a Khond child under seven years of age. This child is fed and clothed at the public expense, and eats with no other person, and is not subjected to any act deemed impure.

For a month prior to the day of sacrifice, there is much feasting, intoxication and dancing round the victim, who is adorned with garlands, &c. and, the day prior to the sacrifice, is intoxicated with toddy, and made to sit, (if necessary tied with seven ropes) at the bottom of a post which has previously been planted with some ceremonies, and on the top of which is an effigy of a bird, and at the foot of which a brass figure of the same bird is buried. The Khonds and others dance round the post to music, and addressing the earth, say, " O god! we sacrifice to you, give us good crops and seasons and health." Then the victim is addressed—" We have bought you with a price, not seized you, and now sacrifice you according to custom. No sin rests on us." On the following day the victim is intoxicated with toddy again, and anointed with oil. Each individual present touches the anointed part, and wipes the oil on his own head. They then proceed in procession around the village and its boundaries, bearing the victim, who is preceded by music and a long pole to the top of which is attached tufts of peacocks' feathers. On returning to the post, which is always placed near the village deity (*Gram devete*), here called " *Jakaree penoo*," represented by three stones, and near to which the brass effigy of a bird, before alluded to, intended to represent a peacock, is always buried. They proceed to dig a pit, and having killed in sacrifice a hog, the blood is allowed to flow into the pit. The victim, who, if it has been found possible, has been made senseless from intoxication, is seized by five or six persons, thrown into the pit, and his face kept pressed to the earth, till suffocated in the bloody mire. All cries, if any, are drowned by the noises of instruments. When supposed to be dead, the Janee cuts a bit of flesh from the body, and buries it with ceremony near the effigy and village idol, as an offering to the earth; all present then cut pieces of flesh and carry it to their own villages, where part is buried before the same idols, and morsels in the boundaries of the villages, or fields, to which it is carried in procession, with music, &c. The head and face remains untouched, and when the bones are deprived of flesh, they are buried with the head in the pit.

Subsequently to this horrid rite, a calf is brought before the post, and his four feet being cut off, it is left there till the following day, when women, dressed in male attire, and armed as men, drink, and dance, and sing round the post. The calf is then killed and eaten, and the Janee dismissed with a present of rice, and a hog or calf.

Captain Millar (43d Regiment N. I.) when at Coopantee, managed with much discretion to rescue no less than twelve victims; seventeen more have fallen into my hands, making in all twenty-nine. The first who made her escape to my camp, although closely fettered, disappeared after a few days, and I could never learn more of her. She was an elderly woman; of the remainder, ten were restored to their friends, and eighteen children from three to ten years of age, remain with Captain Millar and myself. These were all sold by their parents, or I have been unable to discover their history and origin.

This account differs in some particulars from other accounts which have been published. There may, however, be different modes followed: this account may be considered to be authentic.

The remaining documents to be adduced are two forms of oaths. The one alluded to by Mr. Stevenson is the following :—

Form of Oath.

1. A blood-sucker,
2. A bit of tiger's skin,
3. Peacock's feather,
4. Earth from the white-ants' hill,
5. Rice mixed with fowl's blood,
6. A lighted lamp.

The substance of the circumstance is first repeated by the swearing party, and a basket containing the following things being held before him, he proceeds with his oath, touching each object in the basket at that part of the oath which refers to that object :— the blood-sucker, the tiger-skin, &c.

"Oh father (god!) I swear, and if I swear falsely then, oh father! may I become shrivelled and dry like a blood-sucker, and thus die; may I be killed and eaten by a tiger resembling this blood-sucker, may I crumble to dust like this white-ants' hill, may I be blown about like this feather, may I be extinguished like this lamp."

In saying the last words he puts a few grains of the rice in his mouth, and blows out the lamp, and the basket with its contents is made to touch the top of his head.

Yeree ubba,	hahumoo,	hurrudda,	attamo,	mi,	dosha,	shiddee
Oh Father	I	Oath	take	by me	fault	if is

yera,	neekee	surruda suttumo	Yeree ubba.
on	that account	to me and mine	oh Father.

Ghoe, dingee,	Bassee, Bassee,	Sunnummoo.
blood-sucker like,	dry and shrivelled,	may I die.

Ghoyee, dingee,	Khradee hanee	nangee	yesta challa	tinee
A blood-sucker like,	a tiger may come	me	having killed	eat

Beera, dingee	Mhaihe	hanai.	Mendoo, kuttaka
white-ant hill-like	crumble away	may I come.	Peacock, feather

hanai	yengae sahe	yenjoo	dippo	dingee	yengee
may I be	blown away	this	lamp	like	this manner

nimee	mammo.
may I be,	extinguished.

The other form, of a special character, is as follows:

Oath taken by the chiefs of the Mootahs of Rottungen, and Chinungea, on the occasion of the settlement of a boundary dispute, which had been for many years the cause of war between the two districts.

"The dispute which has existed between us so long is now decided—we will forget it and remain in peace, and hold our lands according to the limits laid down. Whichever party acts otherwise, and causes disputes again to arise, let him be reduced to dust, and his race and name become unknown."

The parties administered the oath to each other, holding over the head of the swearing party a basket of the soil, whilst he repeated the words of the oath.

Such are the materials which I have endeavoured so to digest as to place them in a somewhat clear and intelligible order. I do not know that any remarks of mine, whether laboured, or otherwise, could add to the deep but melancholy interest, which these documents are calculated to excite. It is quite clear that these people are not Hindus; though a few ideas may have been borrowed from the latter. The Khoonds are clearly in a state next to entire barbarism. I am told that people from the north speak of the *khoi*-mountaineers as wild, deformed, and of vindictive character; so much so, that it is not safe to speak to one of them, as a real or imaginary affront is never forgiven, but if possible is avenged with blood. They are also said to be potent in the use of charms, and incantations; but these may be idle tales. One cannot, however, but remark their dissolute and drunken habits, as in most semi-barbarous people; a description of vice usually leading to vindictiveness, ferocity, and blood-shedding. And when ferocity and murder become parts of a people's religion, every thing else may be expected that is degrading to human nature. Philanthropists have a new field opened for their exertions; and I would, with pleasure, anticipate the time when they may become a Christianized, civilized, humane, and respectable, people.

I have to solicit indulgence for any possible faults, that may have inadvertently entered into these observations, which have been prepared amidst many other, and very dissimilar, occupations.

[The foregoing article, based principally on information communicated by the late lamented Commissioner in Goomsoor, will, independent of its intrinsic value, be read with lively, yet melancholy, interest, as a posthumous relic of one, who, to the infinite regret of his many friends, and great loss of the Government, whose upright and talented functionary he was, has been cut off in the prime of life, and in the midst of a career which must have proved eminently useful to the country, as well as highly honourable to himself.—*Editor.*]

III—*Abstract of Eight Months' Meteorological Observations at Moulmein.—By* James Dalmahoy, Esq. *of the Madras Medical Establishment. Physician to His Highness the Rajah of Travancore.*

The accompanying tables furnish a few data respecting the periodical oscillations of the barometer, and the heating power of the sun's rays at a station within the tropics. They contain also some other observations usually supposed to be connected with the movements of the barometer. As they refer to a period of eight months only, no general conclusions regarding the climate can be deduced from them, and therefore it was thought unnecessary to give a mean at the foot of each column.

Moulmein or Maulamyne, the principal station in the Tenasserim provinces, is situated in 16° 30′ N. L. and I believe about 97° 30· E. L. It may be considered at the level of the sea, for the river, on the bank of which it lies, has free communication with the sea not eight miles to the westward, besides its more distant mouth at Amherst to the south. The observations were made at the height of thirty or forty feet above the surface of the river.

The barometer employed was a portable one of the syphon kind, and therefore required no correction except the reduction of the observations to a common temperature. The sound produced by striking the mercury against the top of the tube indicated that there was no air interposed. In making the observations, precautions were used to obviate the effects of friction between the tube and mercury. The barometer, also the wet-bulb thermometer, and one exactly similar for ascertaining the temperature of the air, were made by Mr. Robinson, of London. The thermometers were graduated to quarters of a degree of Fahrenheit's scale. The maximum and minimum thermometers were made by Mr. Adie, of Edinburgh, whose plan of introducing naphtha, above the mercury, in the former instrument, is completely successful in preventing the retraction of the index. The actinometer,* an instrument invented by Sir J. Herschel, was made by Mr. Robinson. It was observed only at apparent noon, and the glass plate in front of the bulb was always placed at right angles to the direction of the sun's rays. In making an observation, a board, just sufficient to intercept the direct rays of the sun, was held at some distance by an assistant, and the rise of the instrument during one minute was noted; the board was then suddenly withdrawn, and the rise during an equal interval again noted; the rays being once more intercepted, an observation similar to the first was repeated. The quantity recorded in the table is the excess of the second of these observations above the mean of the first and third. The photometer was a portable one with the usual glass screen, and was procured from Professor Leslie's own maker in Edinburgh. The observations with it were made in the following manner. The instrument was exposed so as already to have attained its maximum at apparent noon. The direct rays of the sun were then suddenly cut off, and the degrees lost during *half* a minute were numbered and recorded. This method of using the photometer was suggested by the principle on which the observations with the actinometer are made. The rain was received in a tin vessel having its aperture horizontal and of known area. The water was then measured, and it was easy to observe the quantity of it corresponding to the thousandth of an inch in depth. Merely a thread and feather were used to shew the direction of the wind, and its velocity was only estimated by the help of a scale given in the appendix to Dr. T. Young's Lectures. The velocity recorded is the mean of the separate estimated velocities. Professor Forbes[*] has recommended the adoption of Lambert's method of registering the direction of the wind. According to this the south was denoted by 0° S. W. by 45° W. by 90° and so round the whole horizon. But to this plan it is a weighty objection, though apparently overlooked, that if the wind be registered as varying between S. W. and S. E. or between W. and E. always going round by S. the result will erroneously represent the mean direction of the wind to have been from the N.

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* See Reports of the British Association, &c. vol. ii. p. 379.

Remarks on the Tables.

In table I, under the head thermometer, is given the mean minimum and mean maximum temperature; also the mean at 9¼ A. M. and 9¼ P. M. as these two latter periods divided nearly equally the intervals between the periods of least and greatest temperature, the mean temperature of the month is deduced from the observations at all the four. The time of maximum temperature seemed to be between two and three P. M.; it was sometimes hastened by the early setting in of the sea breeze.

The hygrometric state of the air was determined by Leslie's method, the mean temperature of his dew-point and corresponding tension of vapour having been deduced from the mean temperature of the air and mean temperature of the wet-bulb thermometer. I am aware that the tension of vapour corresponding to the mean temperature of the dew-point is a little less than the mean tension, but the difference can seldom exceed what is due to two or three tenths of a degree of Fahrenheit's thermometer. The column marked dampness, gives the quotient arising from the division of the number expressing the tension of vapour at the mean temperature of the dew-point, by that expressing the similar tension at the mean temperature of the air. The sixth or last column, under the head hygrometer, affords, in connexion with table II. data for calculating the amount of evaporation.

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[*] Reports of the British Association, &c. vol. i. p. 249.

With respect to the quantity of rain recorded in the table, it is less than what usually falls during the corresponding period. The average annual fall of rain at Moulmein is above two hundred inches. Formulæ have been given for finding the mean fall of rain at any latitude, but it cannot be doubted that besides the distance of a station from the equator, its distance from the coast, the direction of the line of coast, the relative positions of the sea and land with respect to that line, and probably many other circumstances unite in influencing the amount of rain.

The times for recording the barometer were selected as furnishing its two maximum and one of its minimum heights. It did not appear however, that there would have been any sensible difference between the mean of the observations at 9¼ P. M. and 10¼ P. M. A comparison of the consecutive monthly differences of the barometer at the three daily periods of observation shews that, at each of these, the column of mercury decreased without intermission from January to June inclusive; in July, it again increased a little. The fall of the barometer may possibly have been caused by the shifting of the prevailing winds from the N. E. and N. W. to the W., S. W. and S. as indicated by table II., but there is nothing either in this, or the first table, to account for the increase of pressure in July.

With regard to the daily oscillations of the barometer, their magnitude is undoubtedly affected by local causes, but these latter ought perhaps only to be regarded as accidental disturbances of those general and constant causes on which the oscillations themselves depend. It appears, from the table, that both of the oscillations recorded increased from January until the end of March, and then diminished: in other words that though, as has been observed, the mean height of the barometer decreased, from month to month, at each of the three periods of the day, its decrease at 3¼ P. M. was more rapid, until the end of March, than at 9¼ A. M. and 10¼ P. M. The oscillations at a given latitude are supposed by M. Bouvard to vary in magnitude directly with the temperature, on the centigrade scale, of the period during which they occur. Is it not possible that they may also vary with the tension of the atmospheric vapour? It will be observed, on reference to the table, that this tension was greater at 9¼ A. M. and 9¼ P. M. than at 3¼ P. M. from February to May inclusive, while on the contrary it was less during January, June and July.

Professor Forbes* from a comparison of most of the recorded observations, has deduced a formula for finding the mean oscillation between 10 A. M. and 4 P. M. at any given latitude. The result of this for latitude 16° 30′ is 2.35 millimetres or 0.092 of an inch. The mean of the observations in the table cannot be considered the experimental mean at Moulmein, for, three out of the four unrecorded months being rainy, the former would almost certainly exceed the latter. The mean of 0.133 the greatest and of 0,077 the least quantities in the table, equal to 0.105, is probably very near the true mean. The difference between this and the result of the formula is a less fraction of the whole oscillation than occurs in a similar comparison in lat. 56° between the result of the formula and the mean of Professor Forbes's own observations; the errors in the two cases are however of opposite kinds.

The manner in which the observations in table III. were made, has been already noticed. The calculated altitudes of the sun at the period of the first observation on 7th January, and at that of the last on 30th April, were respectively 51° and 88° 17′. Supposing the atmosphere equally pervious, the ratio of the intensity at the former angle to that at the latter, is theoretically a little greater than 9-tenths, a ratio approaching much nearer to equality than it would have done if the altitudes had been smaller with the same common difference. It is remarkable that on the 14th January the photometer indicated 37, the greatest intensity recorded, and on the following day 32, the only other observation as great as the latter of these having been on the 30th April. It suggested itself to me at one time as probable that the apparent effect of the sun's rays might be influenced by the temperature of the instrument employed to measure it, but there can be no doubt that this and every other disturbing cause is excluded in the results obtained by means of the actinometer. The varying quantity of undissolved vapour lying in the path of the rays, offers perhaps the best explanation of the anomalous variations in their intensity, as was suggested by Dr. Richardson in explanation of the apparently great power of the sun's rays at Fort Franklin. Successive strata of thin vapour at a great height, may be conceived to intercept many of the heating rays, without causing a diminution of transparency sensible to the eye.

I regret extremely that the tables contain no observations on terrestrial radiation at night. The method of using the actinometer in the measurement of solar radiation, as already described, is applicable also to terrestrial radiation. Of course in this case the glass plate between the bulb of the instrument and the sky would need to be removed: it would also be necessary to lengthen the time of observation, and, in order to admit of comparison with other experiments, it ought further to be determined to what portion of the whole heavens, and in what direction, the instrument was exposed. It may be remarked that the method of measuring the intensity of terrestrial radiation by the maximum difference between the shaded and exposed thermometers is subject even to greater error than in the case of solar radiation, for it is evident, from the extremely heavy dew on a clear night, that the whole surface of the ground attains the temperature of the dew-point, and hence a detached thermometer must sink below it. But as soon as this happens, the decrement of temperature can no longer be a measure of the intensity of radiation in the same sense it was before, for there is now a continual influx of heat to the bulb from the condensing vapour. It might easily be shewn by the same process of reasoning employed to establish the dew-point formula, that if the tension of vapour corresponding to the minimum temperature of the exposed thermometer, be subtracted from the tension of vapour at the dew-point, and the difference be multiplied by 87, this product will express the additional number of degrees, on Fahrenheit's scale, which the exposed thermometer would sink, were it not for the dew.

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* Transactions of the Royal Society of Edinburgh, vol. xii.

P. S.—I venture to add, in a postscript, a few remarks which, while they are not altogether foreign to the subject of this paper, are not worthy of a separate place.

It is sometimes required to determine the internal diameter of a barometer tube when circumstances prevent its direct measurement. As this method of doing so, though easily derived from an elementary optical proposition, may not immediately suggest itself to those having only accidental occasion for it, it is here annexed. Apply the points of a pair of compasses to the external surface of the tube, and holding the eye opposite to them, and as far removed as is consistent with distinct vision, measure the least distance between the parallel sides of the bore. Two-thirds of this quantity is nearly equal to the true internal diameter. A nearer value is obtained by the following rule: add to the external diameter of the tube twice the distance of the eye from one of the points of the compasses, and divide by twice the distance of the eye; the product of this quantity into the approximate value already found, is very nearly equal to the internal diameter of the tube. When the external diameter is .333 of an inch, the apparent internal diameter .12 of an inch, and the distance of the eye 4 inches, the results of the two foregoing approximations, and of an exact calculation give, respectively, as the values of the internal diameter, .08 of an inch, .0833 and .08367.

TABLE II.—*Shewing the direction and estimated velocity of the wind.*

		N.		N. E.		E.		S. E.		S.		S. W.		W.		N. W.		Calm.
1836		No. of obsns.	Aver. velocity.	No. of obsns.	Aver. velocity.	No. of obsns.	Aver. velocity.	No. of obsns.	Aver. velocity.	No. of obsns.	Aver. velocity.	No. of obsns.	Aver. velocity.	No. of obsns.	Aver. velocity.	No. of obsns.	Aver. velocity.	No. of obsns.
Jan.	9½ A. M.	1	4.	20	4.5	3	5.	7	6.	0	0	0	0	0	0	0	0	0
	3½ P. M.	0	0	1	5.	0	0	1	6.	0	0	2	5.	2	3.	25	3.5	0
	9½ P. M.	1	1.	14	2.5	1	2.	0	0	6	2.	5	1.75	0	0	0	0	4
Feb.	9½ A. M.	3	4.5	20	3.	2	3.5	4	5.	0	0	0	0	0	0	0	0	0
	3½ P. M.	0	0	0	0	0	0	0	0	1	8.	3	5.	12	5.5	13	4.	0
	9½ P. M.	0	0	2	1.	0	0	0	0	12	3.	14	2.75	0	0	0	0	1
Mar	9½ A. M.	2	3.5	17	3.	0	0	0	0	1	1.	7	3.	2	3.	0	0	1
	3½ P. M.	0	0	0	0	0	0	0	0	0	0	5	8.	24	6.25	2	5.	0
	9½ P. M.	1	1.	5	4.25	2	3.	0	0	10	3.	12	3.75	0	0	0	0	1
Apr.	9½ A. M.	1	3.	1	1.	1	1.	0	0	2	4.	6	4.	13	2.5	2	2.	1
	3½ P. M.	0	0	0	0	0	0	0	0	1	6.	16	8.25	12	9.	1	10.	0
	9½ P. M.	0	0	0	0	0	0	0	0	6	4.	22	5.	2	3.	0	0	0
May	9½ A. M.	1	1.	1	3.	3	1.	3	2.5	3	5.	2	2.5	6	1.5	0	0	4
	3½ P. M.	0	0	0	0	0	0	0	0	7	4.75	8	6.	6	5.25	0	0	0
	9½ P. M.	0	0	0	0	1	1.	3	3.	6	3.75	6	5.25	2	3.5	0	0	3
June	9½ A. M.	0	0	2	2.	2	2.5	2	3.	7	1.5	4	2.	3	1.5	0	0	8
	3½ P. M.	0	0	0	0	0	0	1	6.	10	4.75	12	4.	5	3.75	0	0	2
	9½ P. M.	1	2.	0	0	2	2.	2	3.5	5	3.	0	0	3	2.25	0	0	17
July	9½ A. M.	1	2.	2	2.5	0	0	2	2.5	7	1.25	4	2.75	6	2.	1	3.	8
	3½ P. M.	0	0	0	0	0	0	0	0	4	4.5	12	5.	10	3.	1	2.	4
	9½ P. M.	1	1.	2	2.	1	1.	4	1.75	3	3.25	5	3.	1	1.	1	4.	13

Note.—In the above table the velocity of the wind is expressed in miles per hour, but merely by estimate.

TABLE III.—*Shewing the heating power of the Sun's rays at apparent noon.*

1836.	Date.	Photometer.	1836.	Date.	Actinometer.	Photometer.	1836.	Date.	Actinometer.	Photometer.
Jan.	7	24	Feb.	20	10.5	24	March	30	9.25	22
	8	30		22	11.25	28		31	10.5	23
	9	30		23	10.	22	April	2		22
	11	2		24	10.5	21		4	9.5	19
	12	24		25	9.25	21		5	2.25	3
	13	23		26	11.	24		6	11.	18
	14	37		27	11.	23		7	11.	21
	15	32	March	1	9.5	23		8	11.	26
	16	26		2	9.25	21		9	8.5	16
	19	7		3	9.	20		11	10.	20
	20	24		4	10.	24		12	11.25	25
	21	22		5	9.75	19		13	13.	25
	22	23		7	8.5	18		14	12.5	30
	23	22		8	8.25	20		15		26
	26	22		9	7.5	15		17	11.25	21
	27	26		10	9.5	18		18	10.25	24
	28	23		11	12.	24		19	10.75	26
	29	25		12	8.75	20		20	6.5	15
Feb.	1	20		14	12.75	22		21	11.	28
	3	26		15	9.5	18		22	7.25	20
	4	24		16	7.5	17		25	12.	27
	5	26		17	7.5	14		26	12.5	28
	6	26		18	8.	15		27	11.25	25
	8	27		19	8.	13		28	11.5	29
	10	25		21	1.	3		29	12.	29
	11	23		22	5.	11		30	13.5	32
	12	22		23	0.5	2				
	13	24		24	6.5	12				
	15	24		25	0.75	1				
	16	24		26	7.5	15				
	17	21		28	9.5	24				
	18	22		29	3.5	7				

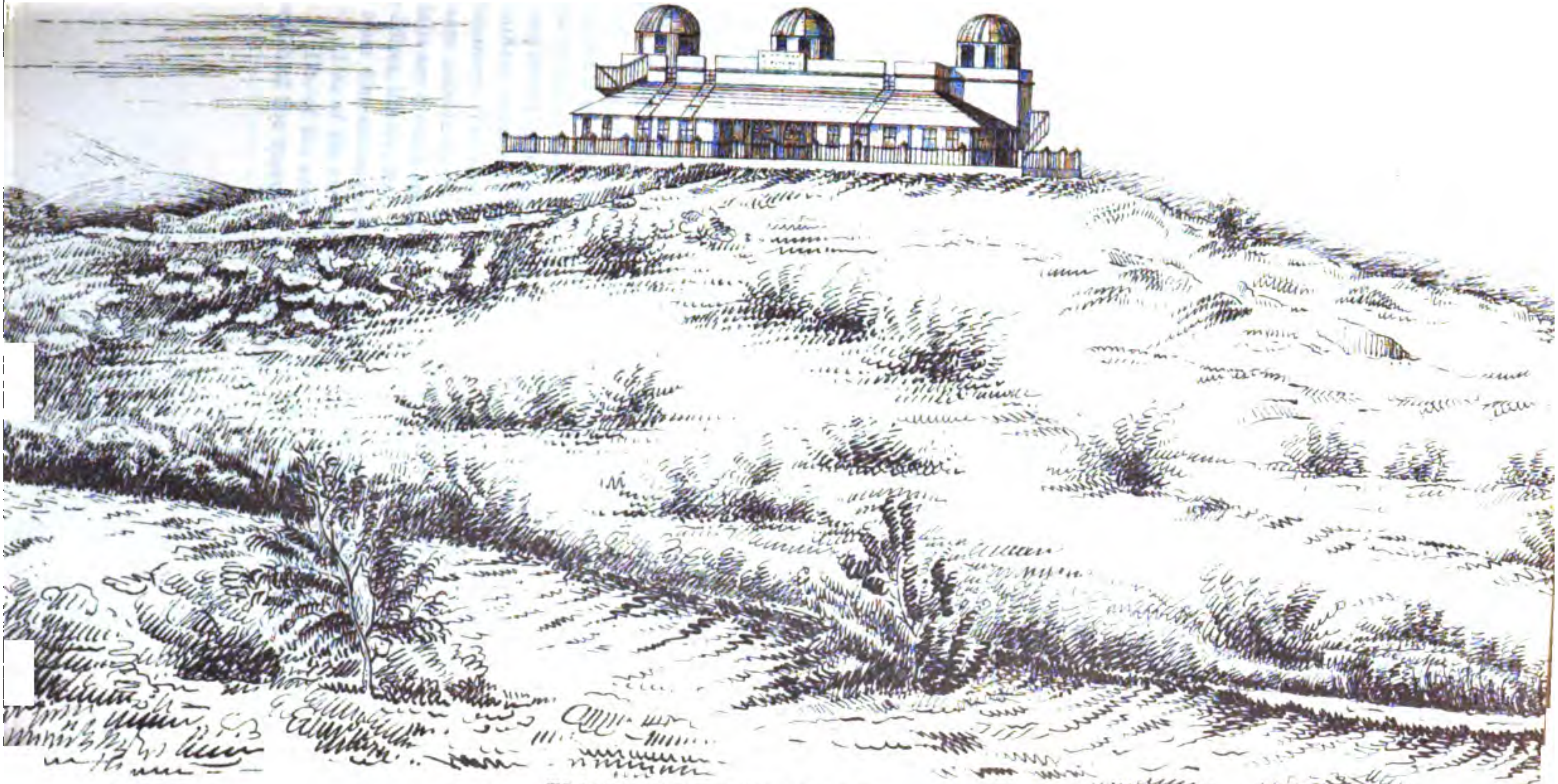
Note.—For an explanation of this table see the accompanying remarks. It may be remarked that the observation of the photometer was not strictly simultaneous with that of the actinometer, but immediately after it.

IV.—*Description of an Observatory lately established at Trevandrum, by* His Highness *the Rajah of Travancore.*—By John Caldecott, Esq. *Astronomer to His Highness.*

His Highness the Rajah of Travancore, already celebrated for the munificence with which he promotes the education and mental improvement of his subjects, resolved in the latter part of last year on the establishment, at his capital, Trevandrum, of an Observatory of a superior kind; with the double view of affording his aid to the advancement of astronomical science, and of introducing by its means correct ideas of the principles of this science among the rising generation under his government; and having confided to me the superintendence of the institution as Astronomer, I take this early opportunity of introducing it to the notice of the public, by a short description (which may be enlarged hereafter) of the three great features of its future usefulness, viz. the building—the instruments—the locality—convinced that the description of a new Observatory so situated, and established with such objects, succinct and somewhat imperfect as at this early stage it must necessarily be, will still be received with lively interest, not only by astronomers in particular, but generally by the many who are now contemplating, with sympathy and admiration, the rapid strides with which intellectual culture is advancing among our native brethren of India.

1.—The Building.

When it devolved on me to design a plan by which the liberal intentions of His Highness might be carried into the most complete effect, it became with me a matter of serious consideration, how the utmost benefit to science might be derived from the opportunity afforded by the proposed institution, without making any very great demand on the funds of the state; and I very soon came to the conclusion that no outlay, beyond what was absolutely necessary to effectiveness, should be made on the building, but that no expense should be spared in procuring instruments of such a size and quality as would ensure to an Observatory, where they were judiciously and actively made use of, a rank second to none in the world. Being supported in this view of the case by Colonel Fraser, the British Resident at Travancore (a gentleman most pre-eminently qualified to judge on such a matter), the plan now to be explained was sanctioned by His Highness, and the building has since been completely and most satisfactorily erected, by Lieut. Horsley, of the Madras Engineers, through whose kindness I am enabled to accompany this, with two perspective views, a plan, section, and elevation, which will render but a short verbal explanation necessary.



TREVANDRUM OBSERVATORY.

The extreme dimensions (i. e. including the verandahs) are seventy-eight feet in length, east and west, and thirty-eight feet in breadth, north and south; these, although small compared with most other public Observatories, will, it is hoped, prove amply sufficient for all useful purposes.

The hill on which the observatory is erected is a solid mass of laterite, in which granite is largely disseminated, and is so hard as to be penetrated with great difficulty; but little depth was therefore required for the foundations, which are accordingly only sunk one foot below the surface, on which the granite bases for the instruments are erected—this surface is by excavation three feet below the general level of the soil outside, and three and a half feet below the floor of the observing rooms. On it is erected, nearly to the height of the floor, but without contact with it, or with the surrounding walls, a solid mass of granite masonry for each instrument, consisting of large pieces of stone clamped together; that in the transit room (*a*) is ten feet long, by four feet broad; that in the circle room (*c*) ten feet square, and that in the centre room (*b*) six feet square. The walls are two feet in thickness, built of squared stones of laterite, and afford a clear height in the observing rooms of seventeen feet. The meridional openings are three in number, each two feet wide, and extend across the building to within three feet of the ground on each side—they are well secured and conveniently laid open by shutters covered with canvas, and painted, and having slips of copper over the abutments. The roof is flat, and on the centre of it is erected a wooden circular building, of nine feet diameter, with a revolving dome which covers a solid pillar of granite, coming up through the centre room without contact with floor, roof, or any part of the building, and terminating about three feet above the flat roof. This pillar is two feet in diameter at the top, and four feet at bottom, and is erected on the granite base of six feet square—the pillar consists of five pieces in the form of a frustrum of a cone. Two other revolving domes of the same size are placed over the circular rooms at the southern corners of the Observatory, which are square turrets of solid masonry. The roof or terrace is conveniently approached by two stair-cases outside the building, and winding round the turrets. The verandahs are divided into small rooms as sleeping apartments, computing offices, library, &c.

The clear dimensions (inside) of the transit room (*a*) are	14 ft.	by 12.
Do. of the circle room (*c*)	14 ft.	by 12.
Do. of the centre room (*b*)	20 ft.	by 12.

The breadth of the verandah is eleven feet.

On the north and south faces, and let into a panel, formed in the parapet wall, are to be placed marble tablets, bearing an inscription as follows :—

THE TREVANDRUM OBSERVATORY,
FOUNDED BY
HIS HIGHNESS
Sree Padmanabha Dassa Vunchee
Baula Rama Vurma Koola Shakhur
Kireeta Pukee Swatee Rama Rajah Bahadoor
Munnei Sooltan Shemshair Jung.

A. D. 1837.

SOOBROW DEWAN.

Colonel JAMES STUART FRASER—*Resident.*

John Caldecott, Esq.—*Astronomer.*

W. H. Horsley, Esq. Madras Eng.—*Architect.*

The inscription on the north face being in English, and that on the south a translation of the same in Malayalim.

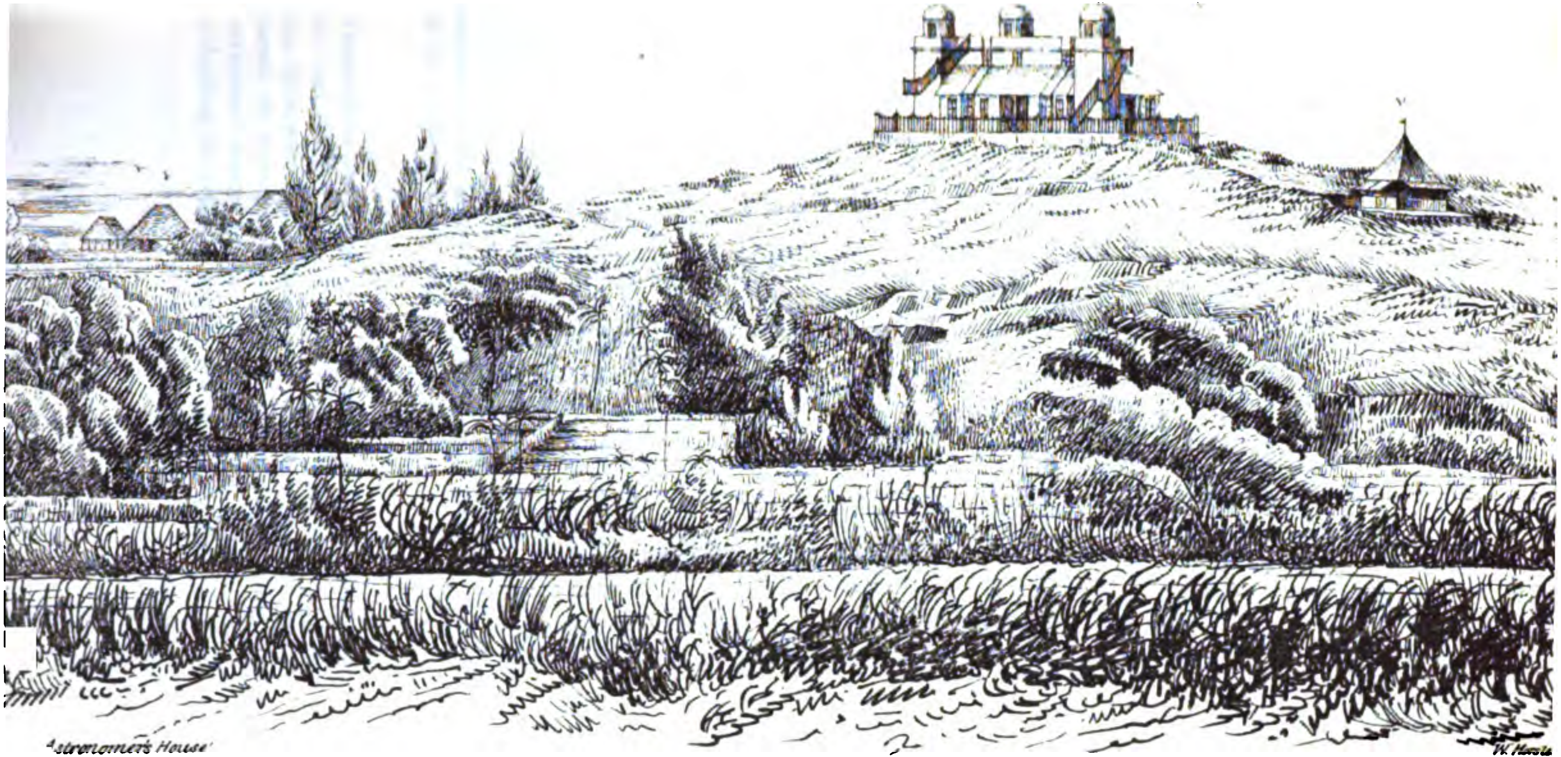
This building was commenced last October, and is now finished, with exception of a little work connected with the granite pillar in the centre room.

2.—THE INSTRUMENTS.

Will comprise—1st. A transit of five feet focal length, and of four inches aperture—ordered from Mr. Dollond, with very particular instructions, that it shall be the most perfect in his power to make. This will be placed in the western meridian room.

2d. A transit clock to be so placed, in a recess cut into the granite pillar in the centre room, as to be easily seen and heard by the observer at the transit instrument, when the door between the rooms is open. This is intended to be as perfect a piece of workmanship as London can furnish.

3d and 4th. Two mural circles of five feet diameter, to be both placed in the eastern meridian room, on the opposite faces of a solid granite wall—one instrument being intended for direct observations of polar or zenith distances, while the other makes simultaneous observa-



Astronomer's House

logical Bungalow.

TREVANDRUM OBSERVATORY

View taken from the South West.

Drawn on Transfer Paper by

Printed by Winch

tions by reflection from quicksilver in the manner now practised at Greenwich. These two instruments are ordered respectively from Mr. William Simms, and Mr. Thomas Jones, with the same instructions as to perfection as those given to Mr. Dollond for the transit instrument.

5th. A clock, exactly similar to the transit clock, to be placed in a corresponding recess on the opposite side of the same pillar.

6th. An altitude and azimuth instrument, having 18 inch, and 15 inch circles, with three micrometrical microscopes to each, made by Mr. Simms, to be placed on the top of the granite pillar above the middle room, and under the revolving dome No. 1. This instrument having been ordered by me, for my own use, about two years ago, has just arrived at Madras, and is now on its way to me by land.

7th and 8th. Two powerful telescopes, one of the refracting and the other of the reflecting kind, with micrometers and all appurtenances for observations on the double stars, &c. to be placed under the revolving domes Nos. 2 and 3.

Besides these principal instruments, the Observatory will be completely furnished with meteorological, magnetic, and pendulum, instruments and apparatus; and the assistance afforded by His Highness in the observing and computing departments, is as complete and liberal as every other part of the establishment.

I may here mention that until these instruments are received from England, observations will be carried on with small but very excellent ones of my own—consisting of the altitude and azimuth circle above mentioned—a thirty inches transit instrument—an equatorial, by Troughton and Simms—a forty-six inches refracting telescope—chronometers—reflecting circle, &c. &c.

I also take this opportunity of announcing that a system of hourly observations throughout the day and night, of the thermometer, barometer, and hygrometer, has already been commenced at this observatory, the result of which will be duly made public : and this, as supplying an important desideratum in the science of meteorology, will doubtless be received by all cultivators of that branch of physics, with the consideration and gratitude which the present Rajah of Travancore will by it eminently entitle himself to.

3.—The Locality.

The Trevandrum Observatory stands on an insulated hill, about sixty feet high, and 195¾ feet above the level of the sea (as ascertained by levelling), from which it is distant, in a straight line, about two miles. It commands an extensive and beautiful view of an undulating and finely variegated country towards the north, the east, and the south—and (overlooking the declivity towards the sea and its fringe of cocoa-nut trees) of the sea horizon to the west. The eastern view is terminated by the Ghat mountains, the highest of which subtend an angle of about 2° 15′, the low hills to the north intercept only 45′ : and from N. N. W. to S. E. the view extends to the sensible horizon itself. The country intervening between the Observatory and these boundaries, on the land sides, consists of hills covered with low jungle, having strips of rice-ground meandering between them, and topes of trees interspersed. On a cliff, between three and four miles distant to the south, and of the same elevation above the sea as the Observatory hill, are built walls of masonry, intended to receive three meridian marks; and to the north an equally eligible situation may be selected for those in that direction.

The geographical situation of the Observatory, as nearly as I have yet been able to ascertain it, is as follows :—

Latitude 8° 30′ 35″ north.

Long. 76° 59′ 45″ or *5h. 7s. 59m.* east.

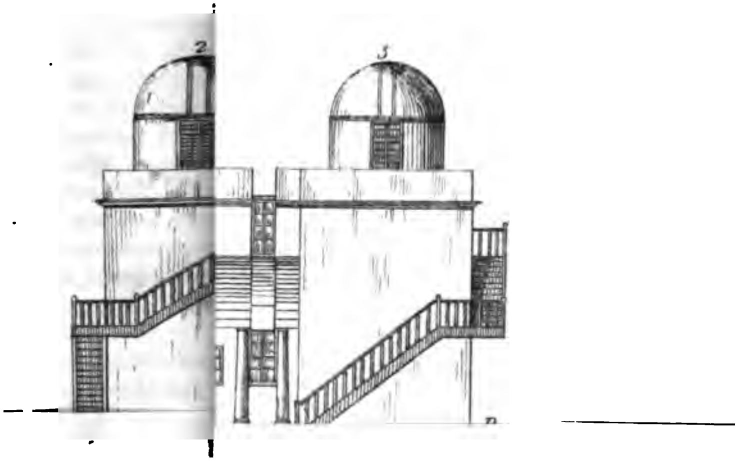
These positions cannot, I think, be in error to the amount of 5″ in latitude, or of 2′ (in time) in longitude—they will, however, be settled with more precision shortly.

With the expression of my earnest hope, that the Trevandrum Observatory may, hereafter take an important part in celestial research, and prove useful to science, I shall conclude this brief account.

V.—*The Objections made by* T. G. Taylor, Esq., *H. E. I. C.'s Astronomer to the Balance Self-Registering Barometer considered ; and further Remarks respecting that Instrument.*—By William Gilchrist, Esq. *of the Madras Medical Establishment.*

In the 15th No. of this Journal Mr. Taylor has advanced several objections to the principle and details of the plan for a self-registering barometer, proposed by me, in the 14th No. These objections I have considered with the attention due to the source whence they emanated, and being humbly of opinion, that those which refer to the principle of the plan do not hold good, I purpose, in the present communication, to state my reasons for thus considering them. With respect to those that refer to the details, it will afterwards be seen that they are easily got over.

I shall (although in Mr. Taylor's paper it be last stated) first consider the objections referring to the principle of the plan, because, if they hold good, they undoubtedly would be what he considers them "fatal to the balance barometer." In page 308, No 15, of the Madras Journal, the case is supposed of an increase of atmospheric pressure equivalent to half an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inch of the mercurial column, then follow these words "the surface "*cc* rises to *ee* and consequently an additional weight (proportional to *ec*) is imposed upon the barometer end of the balance; now "the effect of this weight being to lower the whole tube bodily, it follows that a further rise of the surface *ee* will take place, and that, "successively, cause and effect will ensue until the entire tube is filled, or the end of the tube 'brought up' by the bottom of the cistern." In this sentence I understand by the phrase "the whole tube bodily" the tube and its contained mercury; and by the phrase "further rise" not a rise above 29.5 (the height to which by supposition the mercury has by increased atmospheric pressure risen) but *a second rise*, to that height, the mercury being considered to have fallen with its containing tube, its top surface goes below 29.5, but remains below it only temporarily, as the atmospheric pressure a second time forces it up to that height.

Presuming this to be Mr. Taylor's meaning, I am humbly of opinion that this alternate rise and fall of the mercurial column, does not obtain;—granting for a moment it does, I would arrive at a conclusion as to its effects, different from the one mentioned in the sentence quoted. What causes the tube in the first instance to commence descending? We both answer, the additional weight of half an inch added to the mercurial column. If then the mercury with the tube descends half an inch, it is evident that the mercurial column is shortened to its original length, and consequently the additional half inch weight of mercury is removed; so that the tube, being thus freed of the weight which caused it to descend, ought, I should think, instantly to rise, and remain up until reloaded by a second rise of mercury. By this alternate loading and unloading a perpetual alternate rise and fall of the tube would occur, and of course a perpetual oscillation of the balance: it would appear, however, Mr. Taylor considers that the tube thus lightened will not re-ascend, but, by some means, not mentioned, it will *remain down*, while the mercury makes a *second* rise. But that this alternate rise and fall of the mercury does not occur, will, I think, appear evident when we reflect that the mercurial column is supported by the atmosphere and by that only—the tube merely prevents air reaching the top surface of the mercury, and confines it to columnar limits—when the tube is moved up and down it glides as it were over the mercury, exactly as it would do over a rod of any solid substance, were this substituted for the liquid metal. It is almost superfluous to add this has been proved by experiment.

It does at first sight appear somewhat incredible that the mercurial column, in the case of increase of atmosphéric pressure, should continue rising; while the tube containing it, when suspended from a balance, is descending—for the ascent of the former and the descent of the latter are simultaneous movements. But the enigma is solved the moment we comprehend that there are really two balances concerned, which have a common counterpoise—namely, the mercury. The one balance is composed of this and the atmosphere,—two fluids, the easy mobility of the particles of which allows a ready mutual counterpoise; the other balance is the visible one, of which the mercury and its containing tube at one end, and weight at the other, are counterpoises. Comprehending this, it is easy to trace what obtains, when an increase of atmospheric pressure occurs; the air forces into the tube mercury equal in quantity to its increased weight, and thus effects a counterpoise. But this increase of mercury destroys the equilibrium previously existing between it and the weight; the former preponderating, its end of the balance necessarily descends, but while the tube is descending, the mercury and air preserve their equilibrium, so that the former remains, in the case supposed, at 29.5 inches above the surface of that in the cistern, while the tube slides over it in the manner already described. It may be said that this explanation offers an objection to the balance barometer *more serious* than the one advanced by Mr. Taylor; inasmuch as his shows only an intermitting pull, while this shows a constant one. If no check to the unlimited descent of the tube existed, this would hold good; but let us now attend to what occurs to the lower portion of the tube. Here, as Mr. Taylor remarks, "it must be "recollected that the part of the tube immersed in the quicksilver, lessens the weight imposed upon this end of the balance, to the amount "of the weight of an equal volume of quicksilver." When, therefore, atmospherical pressure causes a given volume of mercury to enter the tube, this descends from increased weight, and necessarily dips into the mercury in the cistern: but this dipping causes the tube to lose so much of its weight as is equal to the volume of mercury it displaces;—so when the volume of mercury thus displaced equals that which entered the tube, an equilibrium is effected; the tube has lost the weight it gained; a further dipping would make it lighter than the counterweights, because, the mercury remaining at 29.5, no additional weight is added by the column; while the further descent of the tube into the mercury makes it as much lighter as the volume of quicksilver it displaces; a further descent of the tube is thus prevented, and if it forced down further than the point at which this equilibrium occurs, it WOULD RISE to that point when the foreign force thus depressing it is removed. Here, then, in this principle of specific gravity, we observe a *third* balance concerned in the balance self-registering barometer; which, like the one consisting of the atmosphere and the mercury, is of the nicest sensibility; and the third balance discharges the important function of preventing the unlimited descent of the tube. The above are the reasons that induce me to think that the *principle* of my plan is correct.

Although this principle of specific gravity is necessarily concerned n the balance barometer, it will not prevent the tube descending further than a given distance, unless a certain relation exists amongst the portion of the apparatus concerned in that principle. Thus, if the tube be of a wide bore and very thin, so great a length of it would dip into the cistern, to displace a volume of mercury equal to what entered the tube by atmospheric pressure, that it might touch the bottom before the equilibrium were effected. Moreover, in the case of tube with expanded top, such as recommended in the original description, the tube ncreases in weight merely from descending, as this descent (as will afterwards be particularly shown) magnifies a portion of the narrow column of mercury, to the area of the large bore at top. It is not therefore to be inferred from the mere inspection of the plan, that this principle is the intended check to the unlimited descent of the tube. These remarks I consider it only justice to Mr. Taylor to make, because I have no doubt that, owing to my omitting to mention in the description of the plan that this is the check to the unlimited descent of the tube I had in view, he was induced to object to the balance portion of the apparatus. In the description of the plan (Madras Journal No. 14, page 27) I mentioned, that a balance, on the usual principles, will suit the purpose of the barometer; and the details of its construction there given, are, as there acknowledged, those recommended for delicate balances by Mr. Braddock, a gentleman to whose mechanical ingenuity and scientific attainments the pages of this Journal bear ample testimony. In such a balance, the centre of gravity is but a small remove below the fulcrum, so that with reference to Mr. Taylor's *first* diagram, the product of a very small additional weight (although much less would do, say 7 grains equal to $\frac{1}{1000}$ of an inch of the mercurial column in the upper part of the burometer) into *a e* would exceed the product of the weight on the end *b* into *b f*, how low soever *a* descends; consequently, did no check to unlimited descent exist, the barometer end of the balance, always preponderating, would descend, and allow the tube to go down until it would reach the bottom of the cistern. In the absence of any mention of the required check it occurred to Mr. T. to place it in the balance; and, as the delicate one proposed, did not suit his views, he proposes to modify the balance in question, by placing the centre of gravity considerably below the fulcrum; in the particular case stated "about two inches." This ingenious idea of Mr. Taylor's would of course effect the object in view. The two objections which he mentions may be urged against it, do not appear of much importance, for with respect to the *first*, simply by moving a weight up and down a screw, may be effected the adjusting of "the axis of suspension to the height above the centre of gravity as shall render the scale we have adopted correct:" and with respect to the *second*, which virtually is the necessity of having "recourse to computation," if this is to be considered an objection, what would become of Science—more especially of the department of which Mr. T. is the industrious cultivator? A more serious objection to it is, that it blunts the sensibility of the instrument, for, *ceteris paribus*, the lower the centre of gravity is placed below the fulcrum, the less delicate is the balance, and as this objection does not hold good with respect to the specific gravity check, it appears to me the more eligible one. In the weighing balance, the centre of gravity is placed below the fulcrum, to produce oscillation; also horizontality of beam, when equal weights are in the scale pans, but as oscillation is not required in the balance barometer the first variety of beam, named by Mr. Taylor, may be used, since the least additional weight moves it, while it is prevented upsetting by the dip or the immersion of the tube into or out of the mercury. In this variety of balance, having also the points of suspension in the same plane with the fulcrum, there is no tendency to move in any direction when equality of weight exists, but remains equally at an angle with the horizon as parallel to it; this therefore is exactly the balance wanted. If I understand Mr. Taylor aright, he considers objectionable the quantum of weight that will necessarily be on the balance, namely "tube of iron," column of "mercury," &c. It is no doubt true that the more a balance is loaded, it is the less delicate, but in the present case this appears more a theoretical than a practical objection, inasmuch as "in Europe, where every obstacle in the shape of workmanship vanishes," balances are made, which, when loaded much heavier than what the balance of the barometer requires to be, turn with much less than 7 grains. A balance has been made of such nice sensibility, that, when loaded at each end with 250 pounds, it turned with one grain.*

As to the substance of which the tube consists, this necessarily requires two qualities amongst others: 1st, impermeability to air; 2d, the power of resisting the chemical action of mercury. Glass combines both of these qualities, and the only objection to it is, its liability to fracture when boiling the mercury—of the metals, only two, so far as I am aware, are not acted on chemically by mercury—namely, iron and platinum. The former Mr. T. has shown to be objectionable, not being air tight. How is the latter circumstanced in this respect? If some of the other metals are impermeable to air, would it not suit to plate with the most eligible one so much of the tube as will not dip into the cistern?

I proceed to mention what appear improvements on the plan as originally proposed—1st. *With respect to the register apparatus.*—It is advisable to remove the counterpoise weights UUU (Madras Journal

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* This balance was constructed on the plan and under the direction of the late Captain Kater, V.P.R.S. for verifying the national standard bushel—vide Phil. Trans. 1826.

Io. 14, plate 15), from the pencil rod, because as the beam in rising bove the horizontal or going below it, describes an arc, this rod with ts weights, is moved more or less from the perpendicular, when both vill have a tendency to bear on one of the guide rods YY. Supposing herefore the rod *fs* to terminate at the scale pan T, the register apparatus below may be moved further to the right. From this the pencil od may rise to the beam, which of course must be prolonged, in rder that the points on which the rod bears may be perpendicular bove the register roller. The disadvantage of the pencil rod deviating rom the perpendicular still remains in this arrangement:—but the end f a beam two feet in length, moving two inches upwards or downwards, leviates from the perpendicular only about quarter of an inch. Further, n the tropics the ordinary range of the barometer rarely exceeds a quarer of an inch (Daniell on Meteorological Essays), and during the storm hat occurred at Madras 30th October 1836, which must be considered s an extreme case, the range of the barometer (as observed at the Madras Observatory, and recorded Madras Journal No. 14, p. 211) was nly 1.135 inch; now, as the pencil rod will be very light, it is possible hat the deviation under consideration, may occasion so very little difference between its absolute weight and its weight as bearing on the beam, that the objection thence arising may be more a theoretical than a practical one. It may, however, should the latter obtain, be completely avoided by placing an arc at the elongated end of the beam, the radius of which is the distance between it and the edge on which the balance turns. The pencil rod may be attached to this arc by means of a piece of platinum wire fixed to the top of the latter, which is of such fineness, that, while sufficiently strong to support the pencil rod, it is so flexible as accurately to adapt itself to the arc. It is evident that by this means the pencil rod will be moved up and down perpendicularly, as it will always be a tangent to the arc when this moves. If the arc be a perfect segment of a circle, the weight of the pencil rod will act with a uniform power on the balance, which of course it will not do if the arc be not such a perfect segment—and as there may be some difficulty in making this, it becomes a question, which of these two modes of attaching the pencil rod to the beam is the less objectionable. Should both be found practically defective, the pencil rod may be laid aside altogether, and the Mordan pencil furnished with its delicate spring, as mentioned in the original plan, be attached direct to the end of the beam at right angles to this. Thus situated, however, the pencil will require a plane surface on which to make the register, for in the case of the cylinder the pencil is a tangent to it only in a straight line, while the pencil, in the position stated, will describe an arc, as the beam moves up and down—consequently the hour lines instead of being straight as in the cylinder, must on this plane surface be segments of a circle, of which the radius is the length between the pencil and fulcrum of the beam. Further, while retained perpendicularly it will require to be moved horizontally, either towards the balance or from it, according as the hour lines are numbered from the right or left side of the plane. The clock-work that (as in the cylinder) gives motion to the plane, must be moved up towards the pencil end of the balance. The plane surface will best consist of glass, which when slightly ground (or frosted) with fine emery, will easily receive the pencil trace. It has the very great advantage of being little affected by heat or moisture, while the hour and horizontal lines may be drawn on the side opposite the one on which the pencil plays, so that this has a smooth surface on which to traverse, whereby the obstruction that might arise from those lines is avoided. From these planes it will be easy to read off to any degree of minuteness the pencil trace by means of a T ruler, the perpendicular limb of which will require to be graduated and furnished with a moveable vernier.

2d. *With respect to the lower portion of the tube.*—It was originally intended to make this sufficiently thick to displace the quantity of mercury necessary to balance that added to the length of the mercurial column by atmospheric pressure—instead of retaining so much solid iron, it is preferable to have a hollow cup of uniform area, and as the bulk of this that will enter the cistern will very nearly equal the bulk of mercury removed, very little alteration in the height of the latter in the cistern will occur. The cistern therefore need be no larger than will admit of the tube to move clear of it, and would best be of an oblong form as the horizontal motion of the tube, that, namely, occasioned by the beam describing an arc, is only in one direction. In the balance barometer the expanded bore at top is only of such length as to meet variations of atmospherical pressure accruing at any place, where the instrument is put in operation, and not for difference of *relative height of situation*—thus if the enlarged bore at top be only four inches long, it is evident that, at an elevation of about 4,000 feet, the mercury will have descended out of it—either the tube must be lowered or the cistern raised. This adjustment can easily be made by means of a screw—however, as a great portion of a tube that would suit at the level of the sea, must for an elevation of 6,000 or more feet be immersed in the cistern, this latter would require to be proportionally deep: by having tubes of different lengths, this increased depth might be avoided.

3d. *With respect to the magnifying the indications*—In addition to the mode mentioned in the description of the plan for this purpose, another suggests itself from what has been mentioned above respecting he principle of specific gravity. This latter mode, which has the very ;reat advantage of not losing power, consists in so proportioning he thickness of tube or size of cup in the cistern to the quantity of nercury added to the column by atmospheric pressure, that the tube :an be moved by a small increase of column to any length required. n the case of a tube of uniform bore throughout (where no additional reight of mercury is added by moving the tube downwards), it is obvious hat the thinner the lower end of the tube is, a proportionally greater ength of it must dip into the mercury in the cistern, before a volume of mercury is displaced equal to what has entered the tube. But, in he case of the tube with expanded bore at top, it is evident that after atmospheric pressure has produced its full effect in increasing the weight of the mercurial column, further weight is added *merely by the continued depression of the tube*—because this depression magnifies, according to the length of it, an equal extent of the *small area* of narrow portion of the mercurial column to the large area of expanded top. This will appear evident on referring to Mr. Taylor's second diagram, in which if *c c* represented the bottom of the expanded portion before the tube be moved down, the upper portion of the narrow column *d* will after the tube descends be magnified to *c c*.

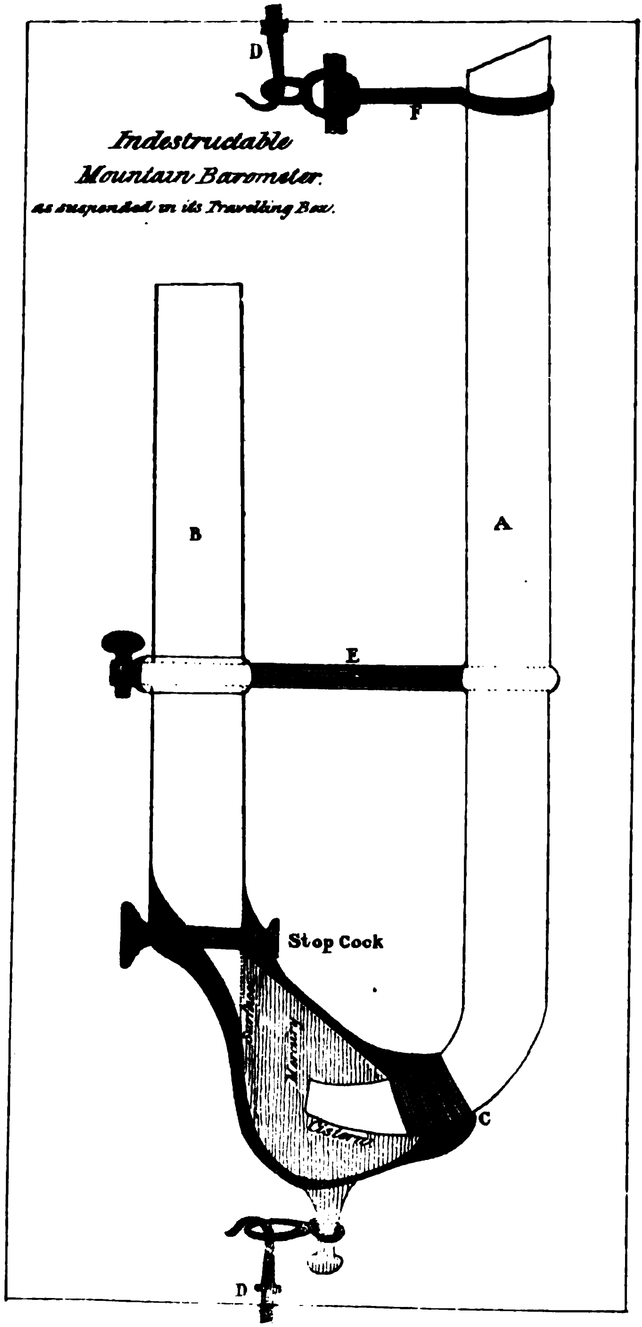
With respect to the expanded tube, therefore, when it is wished to magnify the indications, the increased weight of mercury occasioned by a given atmospherical pressure, must be added to the weight occasioned by the descent of the tube to the extent of the enlarged indication wanted, and the area of the float made of such size as the product of it into the length of the enlarged indication will equal the sum of the bulks of the two weights of mercury just named. Suppose it is desired to magnify the indications five times—expanded upper portion of tube being two inches square, small bore of tube one-tenth of an inch square. Here, for $\frac{1}{10}$ of an inch of rise of mercurial column, the tube must descend ½ inch; taking the cubic inch of mercury to weigh 3434,

Then one cubic inch (= ½ of 2 cubic inches)	=	3434
From which deduct weight of mercury already in bore = $\frac{1}{10}$ inch area ½ inch long.		17.17
Weight of mercury added by ½ inch depression of tube.	=	3416.83
$\frac{1}{10}$ of one cubic inch (= $\frac{1}{10}$ of two cubic inches) added by atmospheric pressure.		686.8
Sum of weight of mercury added by pressure and depression	=	4103.63 grains.

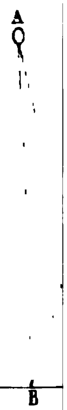
Then $\frac{\frac{1}{2}\text{ cub. inch mer.}}{1717} : 4103.63 :: \frac{\text{area sq. inch}}{1} : \frac{4103.63}{1717} =$ 2.39 square inches the area of the float, A correction is of course required for the thickness and specific gravity of the substance of the cup float. In an instrument such as the present, where practical construction may not have the correctness of its theoretical one, it would appear that the more accurate way of dividing the scale will be to do so from the indications of a standard barometer of common construction.

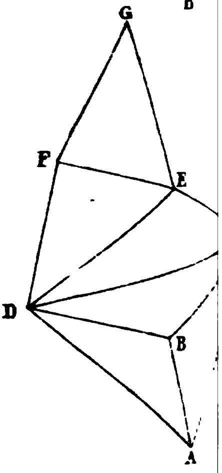
In the case of the cup float there will be a tendency to move the tube from the perpendicular, in consequence of the lower portion of the tube being so much lighter than the upper. This tendency, however, is easily prevented by lowering the centre of gravity of the tube, for which purpose two rods attached to the tube may descend outside the cistern to a convenient distance below it, to support a disc on which a weight may be placed. This weight will if sufficiently heavy bring the centre of gravity of the tube completely below the cup float. Indeed, if this float be sufficiently large to buoy up the tube, the balance part of the apparatus may be laid aside altogether, and the weight below the cistern, acting on the principle of ballast, will preserve the tube in the perpendicular. In order to keep the tube steady it would be necessary to have guides on either side of the tube—the pencil can be attached to any part of it, and made to bear directly on the register roller, which, as the tube moves perpendicularly, may be made in the manner described in the original plan, and in order to admit of the indications being magnified, the upper part of the float can be contracted.

Respecting form No. 2, (Fig. 1st, plate 15, Journal No. 14) the imperfection Mr. Taylor has pointed out as to the impossibility of knowing whether " air does not exist in the quicksilver between *e* and c," is certainly a very serious one and indeed applies not only to the part E C but to the entire tube, since the possessor of such an instrument would not, as in the glass tube, have the advantage of ocular demonstration as to the presence of air; but would be left in doubt on this essential point. Presuming that the objection to iron will be got over by stating it as above mentioned, the following arrangement appears to remove the imperfection under consideration. Let the end C of the metallic tube *rise* into the middle of a cistern, after the manner that the glass tube of the Englefield barometer *descends* in the iron cistern—so that in what position soever the instrument be held the termination of the tube will always be immersed in mercury. On the top of this cistern let there be a stop-cock from which rises the glass short limb—lastly, let a screw enter one side of the cistern, which, when screwed home, will occupy a considerable portion of its area. Suppose now the entire long limb filled with mercury, the stop-cock K turned to prevent its return, also the cistern (the screw being out as far as possible) filled with mercury. Let now the glass limb be attached, and the cistern screw screwed home. Mercury will now stand in the glass tube at a given height—which ought to be engraved on the instrument.



Indestructable
Mountain Barometer.
as suspended in its Travelling Box.



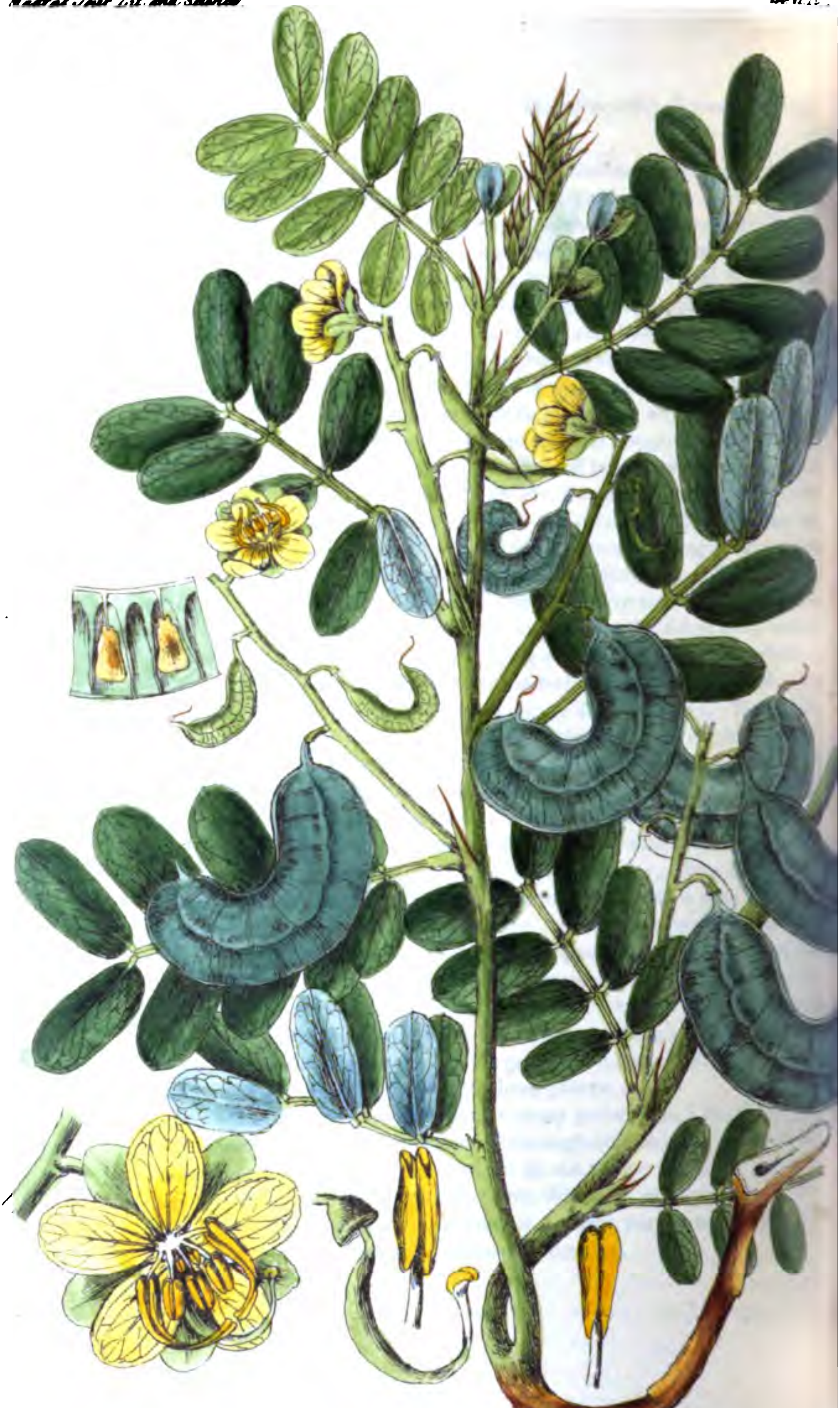


Now, presuming the instrument-maker has thoroughly expelled the ir on first filling the instrument, all that the possessor would require o do in order to satisfy himself as to the pressure of air in any portion f the tube, would be to incline it in order to fill the long limb, turn e stop-cock *k* and screw home the cistern screw. If the mercury ow stands at the height mentioned on the instrument, it of course ust be as perfect as when it left the maker. The long limb ought to e sufficiently capacious to contain all the mercury in the glass limb, nd part of that in the cistern, so that when the stop-cock above the atter is closed, there will be as much air in the cistern as will allow pace for the expansion of the quicksilver in the whole tube, while this ir is prevented entering the long limb, as the end of this will always e immersed in mercury. A simpler form than the above would consist in adopting that of the Englefield barometer, with the addition of a short glass limb rising out of the cistern, the long limb having expanded top, to contain the mercury in the short one, and part of that n the cistern as above mentioned. If this arrangement were applied to M. Gay Lussac's barometer, the possibility of air entering the long limb would be much more likely to be prevented than by the inverted cone, which after all, does not prevent the entrance of air, but merely confines what may have got into the lower part of the mercurial column. The instrument also might be carried in any position, which at present it does not admit of without the danger of air entering.

VI.—*Further Remarks regarding a Plan for an Indestructable Barometer.—By Captain* GEORGE UNDERWOOD, *Madras Engineers.*

In the remarks of the Astronomer of Madras, respecting the Indestructable Barometer and Self-Registering Apparatus, recommended by Dr. Gilchrist, I observe that Mr. Taylor admits that an iron tube can be rendered air-tight by the application of caoutchouc varnish, but adds that this precaution was eventually of no avail on the application of fire, for the purpose of boiling the quicksilver in the tube. Now, since the mercury may be boiled in the tube *before* applying the varnish, I cannot understand why the iron should be condemned for the reason alluded to. True it is, that, with such a material, air bubbles cannot be discerned, and with any opaque substance the liability to error is vastly greater on that account, if some means cannot be adopted for ascertaining the existence of so much air as shall vitiate the observations. However, in furtherance of some hasty and brief recommendations which I ventured to forward to the Journal on the subject of an indestructable and self-registering barometer, as iron was likewise mentioned by myself, I trust I may be pardoned for throwing out the following suggestions, although I am not certain that Mr. Taylor commented at all on the plan proposed by me, since "No. 2" merely is mentioned, without names being specified. The approval which that scientific gentleman bestows on the self-registering apparatus of No. 2, (deeming it very well worthy of attention and likely to be adopted, if the difficulties before stated in the syphon tube can be obviated), as it works on the same *principle* as that proposed by myself, induces me to hope that something may be yet done to bring the matter to a successful issue. For observatories and fixed stations a syphon tube of glass, or semi-transparent porcelain (as suggested by a friend), will at once remove the objections justly stated by Mr. Taylor, and in my first letter this recommendation was accidentally omitted, for at that time my attention was more particularly turned to the rendering barometers, if possible, *indestructable,* and more useful to travellers. The drawing annexed, (Pl. 4. fig. 1.) will, I really think, serve to show that an iron syphon tube may be so constructed as to be easily filled and carried about without the chance of air getting either into the longer limb, or into any situation from which it will not be immediately expelled, when properly prepared for action—(vide figure and remarks). By tapping the barometer while horizontal before working it, the air bubbles will rise to the surface near the stop cock; for since the cistern was nearly full of mercury originally, no additional quantity of air can ever enter it, since the stop cock will be made mercury tight: the passage of air through it will be advantageous. There is room also for the mercury to expand in high temperatures, and after a journey, when the instrument is laid horizontally, trifling particles of air, which may adhere to the sides of the cistern, can be readily expelled by heating the screw end of the cistern after opening the stopper. It will be manifest, also, on inspection before placing the barometer vertically, whether much air has entered the instrument, for the mercury to allow of such occupation must necessarily have been *forced* through the stop cock or screw; but this seems an impossible case, while the air itself can be so much more easily pressed through those places.

From trials with an iron barometer in my possession, I think the long tube should be of one uniform bore throughout, and not larger at the vacuum end, as before recommended by me, unless made by the most careful and expert workman, since the difficulty of boring the latter, and the trouble of expelling air from it, become very great; while the scale also requires more than ordinary attention.



del. Cassia/Senna/Burmanni. Printed by

Remarks on the Figure.—The long limb A, is independent of the other, and the short tube B, with its cistern, stop cock, &c. screws on it at C. By this arrangement the long limb can be easily filled and the mercury boiled therein. When the short cistern limb is screwed on, while the other lays horizontally, mercury can be poured into the cistern to the level of the dotted line, and, from the peculiar shape thereof, the cistern will be as full as requisite, and very little air can remain in it on closing the stop cock. By inspection it will appear evident, that, turn the instrument as you will, the end of the long limb will be always immersed in mercury, and the contained air forced against the sides of the cistern. To keep the air in the cistern always in one part clear of the long or vacuum tube, if suspended in a box large enough to allow of its swinging freely on the hooks DD, no error will arise. The cistern end should always be carried uppermost in travelling or moving.

E. Iron bracket to support and steady the short limb.

F. A suspending iron and ring at the end of the long limb.

VII.—*Notice (with a plate) of the* Cassia Burmanni, *with Remarks on the Materia Medica of India.*—By Robert Wight, Esq. M. D., F. L. S., *&c. Member of the Imp. Acad. Naturæ Curiosorum. Surgeon on the Madras Establishment.*

Madras, 20*th June,* 1837.

My dear Sir,—At the close of my remarks on the cultivation of Senna, page 362 of your last Number, I mentioned an indigenous species possessing considerable medicinal properties, and added, that I should endeavour to procure specimens, from which to prepare a figure. I have now the pleasure to send you a drawing, rather too small to do justice to the subject, but so perfectly characteristic, so far as it goes, as to enable any one who may chance to meet with it to identify the plant—which is all that is wanted.

A recent notice in the public prints of a report by the 'Drug Committee' shows that it is the wish of government, to render this country as much as possible independent of foreign aid in the medical store department, by drawing on the resources of the country itself, for the supply of those medicinal agents required in the treatment of its more prevalent and dangerous forms of disease. As I have at different times paid a good deal of attention to medico-botanical subjects, you will, perhaps, under the protection of a medical plant, permit me to offer a few remarks applicable to the occasion of this paper, though less strictly appertaining to the objects of the Madras Journal, than to one exclusively devoted to medicine.

The report, which appears to have for its object that of showing the course to be pursued in forming an Indian Pharmacopoeia, has not yet, so far as I have learned, reached Madras, and as the notice I have seen does not mention the measures which the Committee propose to pursue for the improvement and extension of our knowledge of that department, my remarks and suggestions will be entirely confined to it.

A cursory retrospect of the history of Materia Medica is sufficient to satisfy any one, however slightly conversant with the subject, that to complete a work of the kind contemplated by the Committee, of even moderate pretensions, is a task of great difficulty, owing to the many sources of error by which it is beset; and such a work can only be raised to the first rank, by the slow accumulation of experience, resulting from repeated experiment and observation, carefully distinguishing, at every step, between the jarring coincidences of *post hoc* and *propter hoc*: the result of which, in many instances, will be, to discard, as inert, medicines which have long enjoyed unmerited reputation, the removal of each of which must be esteemed an advance towards perfection.

The Hindoo Materia Medica, like that of all other nations but little advanced in civilization, is no doubt loaded with many such unworthy articles, but probably not much more so than those of Europe were two centuries ago; of these some may at once be struck out; others, however, can only be removed by the tedious process above specified. On the other hand it embraces many medicines of vast activity, but with whose powers, and the methods of administration best suited to elicit them, we are yet comparatively unacquainted. To detect error in the one case, and to ascertain the existence of valuable properties in the other, the same course must be followed, and not by one man, or in one place, but by many, and in different situations, each, moreover, making sure that he is experimenting on the same plant.

This last precaution is of greater importance than some might suppose. I have repeatedly had wrong plants brought to me, when I had no other means of making known the one wanted, than by reference to the native name assigned in Ainslie's Catalogue, and I have also seen two persons sent in different directions for the same plant, bring different ones, each insisting that his was the true one, and some times both at variance with the systematic name given as the synonym. I know an instance where a gentleman experimented most perseveringly with the common physic-nut (*Jatrophacurcas*) on the supposition that it was the true Croton tiglium, being brought to him by his dresser as the plant so named in Ainslie's Materia Medica. The very same thing happened to myself and on the same authority; I simply put the book into my native dresser's hand, made him read the name, and asked him if he knew the plant—"yes, plenty grow here," was the reply, and the one brought was, as in the above instance, the *Jatropha*. I fortunately knew the difference, and was saved the trouble and disappointment of prescribing grain doses of a medicine that may be taken in half drachm ones, or many seeds, even, be eaten with impunity, provided the embryo, in which their activity is concentrated, be carefully removed. The fact here stated, will no doubt account for some of the very contradictory statements we occasionally hear from practitioners, who have been separately using, as they supposed, the same medicine, one declaring it of great activity, while the other maintains that it is perfectly inert, or at least that its activity is far below what other accounts gave him reason to expect. Such then is the present state of Indian Medical botany, and so long as this kind of uncertainty attaches to the investigations of those who endeavour to raise it to a higher rank in science, by carefully conducted experiment and observation, it is next to impossible that they can succeed, or that it can ever advance to that degree of perfection which it is now the anxious wish of the supreme government it should attain, and might under proper management be made to attain.

Our present knowledge of Indian medical plants is principally derived from the works of Drs. Fleming and Ainslie. These, for the most part, are little more than mere catalogues of native names of plants, with the botanical ones, so far as the authors had the means of ascertaining them; attached, but generally without descriptions, and in no instance with figures of the plants referred to, by which a person unacquainted with botany could ascertain the identity of specimens supplied by a native druggist, with the plant named in the catalogue; and, for want of plates, these, in all other respects valuable, works, to this day remain almost a dead letter. They, it is true, refer to works where botanical characters, and sometimes plates, are to be found, but the books so quoted are in few hands, some of them of great rarity, or so costly and bulky that few can afford to purchase them, or if they did, could conveniently carry them on a march: while Willdenow's *Species Plantarum*, in nearly all cases the leading authority, requires, on the part of the person consulting it, a proficiency in botany, to make out a plant from his brief characters, not easily acquired, and which few obtain.

When these authors published, such was the backward state of the arts in India, that, had they wished it, they could scarcely at any cost, short of sending their drawing to England to be engraved, have illustrated their works with figures of the plants named. Times are now greatly altered: the discovery of lithography, and its application to the representation of objects of natural history, has effected this change: now, as the accompanying figure proves, we may even have good coloured representations, and, I believe, at an expense little if at all exceeding what similar ones would cost in England; say, for quarto sized coloured plates, about 30 or 35 Rupees the hundred, and executed in simple outline, in the manner of those I have already published in the Journal, for less than half the sum.* We may now therefore fairly assume, that, under the double advantage of enjoying the fostering aid of the Supreme Government, and profiting by the flood of light which the unceasing labours of vegetable physiologists has of late years cast on the relationship existing between the natural affinities, botanically considered, and the active properties of plants, the time has arrived for making a rapid advance in this important department of medicine. With these collateral aids, little more is required than industry and judgment on the part of the compiler, to lay the foundation of a local medical botany as perfect as any yet extant. That sufficient materials for such a work are already in existence, I think I may with confidence assume, from having myself, with but little care, collected a considerable store, with the intention of undertaking the work on my own responsibility, should circumstances favourable to its prosecution occur. These it has not yet fallen to my lot to enjoy; and, hitherto, the only advantage I have reaped in return for a heavy expenditure, has been some experience of the manner in which, I think, it should be executed.

It only remains for me to add, as the deduction from the preceding observations, that I consider it next to impossible, without the aid of pictorial illustrations, to make any considerable progress in the knowledge of Indian Medical Botany, and that as these could now be supplied at very moderate cost, the subject seems to be one meriting the attention of government. For myself I am so thoroughly satisfied of the utility, or rather the absolute necessity, of plates, towards aiding the investigations of the naturalist, and more especially those of the tyro in natural history, that I consider it almost a duty to publish, so soon as circumstances will permit, a series of figures representing one or more species of each of the natural orders defined in my peninsular flora, with the view of facilitating the researches of those who (perhaps for the first time) have given their attention to that method of arrangement since the publication of that work. The principal obstacle to be surmounted, in embarking on such publications, is the expense necessarily incurred before any return can be expected; and then the uncertainty of finding a demand for such costly works, sufficient to indemnify the publisher for his risk and first heavy outlay. Whether it will be possible to overcome these impediments in Madras I have yet to learn, but enquiry is now on foot, and if I find that it can be 'got up' at so cheap a rate as to secure for itself, such a sale as will nearly cover the cost, I shall be happy to avail myself of the issue of your next number to make known the plan, and exhibit a specimen of the work, by the publication of a prospectus, and in the mean time, if any among your readers are desirous of encouraging the undertaking, they, by making their wishes known, may greatly contribute towards having them gratified, as the names of even a few unexpected subscribers may go far in determining the course I shall pursue. Apologising for the unexpected length to which this letter has extended,

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* This is cheaper than the Monthly botanical periodicals. The Botanical Magazine, the cheapest of these, charges at the rate of £4 0 4 per 100 4to. plates with letter press descriptions to each, and has a circulation of about 1400 copies. On so large an impression the cost of copper-plates and printing scarce exceeds a half-penny for each impression the principal outlay therefore is the colouring and paper, which cannot be lessened by repetition.

I remain, dear sir,
Yours ever faithfully,
ROBERT WIGHT.

To
ROBERT COLE, *Esquire, &c. &c. &c.*

VIII.—*On the Structure and Habits of the Elanus Melanopterus.*—
By B. H. HODGSON, Esq. *British Resident in Nipal.*

TO THE EDITOR OF THE MADRAS JOURNAL.

SIR,—The following details relative to the structure and habits of Elanus Melanopterus will prove interesting to all persons engaged in the noble attempt to classify birds according to their natural affinities, or, in other words, according to their essential conformation and manners.

Whether this attempt will *succeed* in the hands of such as, for the most part, have no adequate means of knowing more of habits and economy, than can be gleaned from the random notices of merely casual observers, nor any more of structure than can be elaborated from dry skins, remains to be seen. But I return to my subject.

MILVINÆ.

Genus. ELANUS.

Species. ELANUS MELANOPTERUS.

The *Chanwa* and *Chanwa Musaher* of Hindosthan.

Form. The female is 13 inches long, by 35 in expanse of wings, and 8½ oz. in weight. The male is about 1 inch smaller, and seldom weighs above 7½ oz. Both have the same aspect. The following is a detail of the dimensions of a male:—

		inches.	*parts.*
Tip bill to tip tail		12	½
Bill, length, from gape		1	1/16
Bill, length, from brows		0	11/16
Bill, basal height		0	10/16
Bill, basal width		0	15/16
Length of tail		5	½
Expanse of wings		34	0
Length of a closed wing		10	½
Length of tarsus, to sole		1	7/16
Length of central toe	exclusive of talons.	1	1/16
Length of inner fore toe		0	13/16
Length of outer fore toe		0	11/16
Length of hind toe		0	9/16
Length of hind talon (straight)		0	11/16

The bill, from the gape, is as long as the head, that is, actually long: but from the brow it is more distinctly *short:* a peculiarity caused by the width of the mouth and by the advanced position of the frontal plumes. Both the bill and the head, from the nares to the occiput, are distinguished by great breadth; but the bill, before the nares, is much compressed and feeble. The bill is slightly curved from the base; its hook is long and sharp; its upper mandible has a conspicuous accipitrine festoon; and its lower one is rather abruptly truncated but not notched. The cere is of mean size, and is nearly hid by soft curling hairs which radiate from the four angle of the eyes and clothe the lores and orbits: the nostrils are oval, longitudinal, lateral, with a full and free membranous edge on the upper margin. The eye is large and is furnished with a conspicuous salient opercule. The wings are very ample, and usually exceed the tail by 1½ inch. Next to their length, their chief feature is the breadth and softness of the webs or vanes of the feathers. The second quill is invariably the longest; and the third is longer than the first, the former being about ⅜, and the latter ⅝, of an inch less than the second. The primes exceed the tertials by more than a third of the entire length of the former. The first quill is moderately notched on the inner vane, about 1¼ inch from its point: but the notch is less strong and more remote than in Falco. The scapulars are usually about 1½ inch shorter than the tertials. The tail is short, and, like the wings, noticeably soft, as is, indeed, the *whole plumage.* The tail is, upon the whole, nearly even; but there is a slight gradation from below in the extreme lateral feathers, and another from the centre above. The latter seldom exceeds half an inch, but still the tail may be said to be somewhat forked, though there be scarcely a trace of the divaricating structure, even in the extreme feathers. Shortness and thickness are the characteristics of the legs and feet: but the thickness is of that sort which the vulgar call 'gumminess'—not nervous strength. The tarsi are half plumed in front; their residue, and the toes, being very finely reticulated, with the exception of three digital scales next to each talon. The toes are short, unequal, and cleft, but the outer one, though free, can only act in front. The chief feature of the digits is the excess in length of the inner over the outer fore one. The central one has the average superiority over the others in length ; and the hind one is just half as long as the central, or somewhat short but broad and stout. All the digits have nearly the same thickness. The soles of the feet are full and rounded, soft and unballed. The talons are sufficiently large, strong and acute ; the inner and hind being equal; the central as long almost but feebler; and the outer fore, much the smallest. All the talons are rounded below, but none of them are compressed.

The ear, as well as the eye, is very noticeably large ; and the gape reaches to the centre of the eye or more. The breadth of the head, and of the bill near it, have been already noticed; and these features, together with the amplitude of the wings, and the shortness of the tail and feet, seem to indicate (in the language of Mr. Swainson) a Natatorial or Fissirostral type. And, as there cannot, I suppose be *two* such types in the circle of the Milvinæ, it is difficult to imagine how Nauclerus and Elanus can continue distinct in this single circle.

But what the manners of Elanus? The birds of this genus are not, in India, migratory: they breed on (not in) trees, laying usually from 3 to 5 eggs in April, May, and rearing commonly from 3 to 4 young. The Chanwa or black wing quests chiefly in the morning and evening, feeding upon small birds, insects and mice. It does not usually seize upon the wing, though its hunting be, for the most part, by continuous questing. Commonly it is seen skimming the cultivation, like a Circus, occasionally poising itself on the wing for the purpose of getting a distincter view of some mouse, small bird or insect which has stirred on its beat and upon which, when clearly perceived, it stoops perpendicularly with the speed of lightning. After a while, it will resort to some low roost, and, when relieved, commence another excursion, or perchance sit and watch there for its prey. Its forward flight is easy, low, and silent, but very effective in evolution when exertion is required to capture such nimble game as mice, which constitute its ordinary food.

It frequently whips off insects from the stalks of standing grain, after the manner of the Brahmani Cheel or Haliætus (!) Pondicerianus; and this feat is, of course, accomplished on the *wing*. I have also seen the Chanwa pursue cuckoos and sparrows with uncommon energy, but I never witnessed it strike a *bird* in the air. Like the type of Circus, however, the Chanwa doubtless *can*, and sometimes does, seize its feathered prey on the wing. So that its manners are, upon the whole, sufficiently Fissirostral: perhaps as much so as its Raptorial affinities will admit of. Analogies and affinities are very fine abstract terms, which the quiet Orientals would be puzzled to deal with. But, as these words really import no more than remote and near resemblance of form and habits, one can hardly resist the presumption that (strongly as *habits illustrate form*), so observant and ancient a people as the Indians have probably reached some general conclusions as to the true relations of the animate beings of their own country, such as may be, oft-times, more worthy of a philosophical attention than the conclusions upon the same matters that have been elaborated in Europe out of *dry skins*, by dint of inference from structure *so seen*, to habits *wholly unknown*.

Now, it is remarkable enough that the people have, for ages past, been wont to approximate the Elani to the Harriers, but still without confounding the two. Is there any warrant for this approximation? It would seem so: for, both are twilight questers, flying in the same manner and seeking the same prey (mice). Both have large eyes and ears, soft plumage, long wings, wide gapes, large nostrils nearly hid by radiating hairs, bills much compressed and feeble before the cere, but furnished with a long sharp hook and an accipitrine festoon. In several of these common attributes there is an equal and conspicuous tendency towards the Strigine model, which tendency seems to give fresh authority to that approximation of the two groups to *each other*, so long familiar to the people of India, though but yesterday, and still dimly, perceived by the towering ken of European science?

IX.—*Remarks on the Cultivation of Cotton; principally with reference to the finer Foreign Varieties.—By* ROBERT WIGHT, Esq., M. D. *&c. &c. &c.*

(Published by permission of the Madras Government).

The very general failure of nearly all the attempts made in 1832-3 to introduce the cultivation of American and Bourbon cotton into the Peninsula, partly owing to unfavourable seasons, partly to the bad quality of the seed, and not unfrequently from the improper selection of soils on which to sow, induced me to call the attention of the Agricultural Society to the subject at its last meeting. I was in consequence requested by it, to draw up for circulation, in connection with its late liberal distribution of foreign seeds, such instructions for their management as I might think would tend to secure greater success to the attempts now making. In compliance with this request, I have selected the following remarks from materials collected for a more general report on the subject, and trust that they will prove the means of preventing disappointment in some cases, and securing success in others. They divide themselves into two parts or sections, namely, first, an abstract of the most improved methods of culture as now practised, and secondly, suggestions for an experimental enquiry, which I think might be undertaken with a fair prospect of success, and the chance of introducing very great improvements, as I feel quite satisfied that in India we are yet far from having arrived at perfection in this branch of Agriculture.

With reference to the second section I invite communications, and to those who, so far go along with me as either to repeat the experiments I have now in progress, or who, acting on the same idea, think they can more advantageously arrive at the result, though by a somewhat different route, I will feel thankful for any information their enquiries may elicit.

With respect to the seeds either already distributed or in course of distribution, I have ascertained that, with the exception of the Egyptian, the Sea Island of 1836, and New Orleans of 1837 all are, upon the whole, good; the Bourbon, and the Sea Island of 1837, excellent. An easy and economical way of ascertaining their qualities is to soak a few from 10 to 12 hours in water, and then sow them in slightly shaded beds or boxes of loose moist earth: if good, they will generally begin to show themselves in three or four days after sowing. Those covered with a thick coat of fur are a little longer.

In the cultivation of Sea Island considerable attention to the soil and situation seems indispensable. Mr. Piddington in his paper on soils, has shown that a large percentage of calcarious matter is nearly essential to a good cotton soil, a result that corresponds exactly with the following account of the soil of the Sea islands, extracted from Dr. Ure's work on the Cotton Manufacture, vol. 1, page 101. "There is a long range of Islands lying between George Town in South Carolina, and St. Mary's in Georgia which extends from 32° 30′ to 30_o of north latitude, through a space of 200 miles. These Islands were originally covered with live oak, and the other evergreens of a southern climate; they had been the abode of a particular tribe of the red men of the west, who were fishermen rather than hunters: the accumulatian of oysters, clambs, and other kinds of shells, mingled with the remains of the bones and pottery of the ancient Aborigines, is so vast as to fill every stranger with astonishment; and these calcarious matters had become intimately mixed with the sandy soil and decayed vegetables into a peculiar loam, of a light and fertile nature. A former colony of English settlers had made the shores of these islands the seat of some indigo plantations. It was upon two of these islets, separated from the continent by a few miles of grassy salt marsh, that the Sea-island cotton was first made to grow." Again, page 102 "It is within the district from St. Mary's in Georgia to George Town in South Carolina, extending not more than 15 miles inland, that the Sea-island cotton is still confined. Whenever its cultivation has been attempted, to the North, South or West, beyond these limits, a certain decline in its quality has been observed to take place." From this it would appear that the light coast soils are the most appropriate for this sort, and will be still better, when, from the vicinity of deposits of shells, copious supplies of calcarious matter can be had for manure.

The Upland Georgia, or short staple cotton, is not so exclusive in the selection of its soil, but it also prefers a loose grey or reddish somewhat sandy loam, not liable to crack and gape during the hot season. This I consider of consequence, as I esteem it essential to success, in the cultivation of this variety in India, that we change the constitution of the plant from an annual to a perennial, or at least to a biennial, a change which the frosts of its native country prevent, but which we can have no difficulty in accomplishing, all that is required being, to cut down the plants after the crop is gathered, and allow the roots to lie dormant, until the setting in of the next rains revive them. when fresh ploughing and manuring will secure a second, and probably much better, crop than the first; such at least from analogy I judge will be the case. Some further remarks will be found on this subject in a subsequent page. Similar treatment I feel assured will convert our nnual into biennial, or perennial, shrubs,* if the hardening and racking of the black clay soils in which they are grown do not revent by too severely injuring the roots. But I rather think the nnual character is mainly attributable to the stems being left vegetatng after the crop is gathered, by which the strength of the root being xhausted through the constant and severe drain at the time it should e allowed to rest, it is no longer capable, on change of season, of prolucing a remunerating return, and is consequently extirpated to make ray for a more profitable employment of the ground.

As in the cultivation of cotton the broadcast method of sowing is adically bad, advantage should be taken of the introduction of a new ind, to establish with respect to it, at whatever cost, drill husbandry, or if found advantageous, it will extend to the original country variety (which from the soil it affects can never be entirely superseded) and night be the means of enlarging and improving the produce. With this view the seeds should be sown in shallow furrows about 4 feet apart, and the plants afterwards thinned out to two or three feet distance from each other, according to the fertility of the soil and probable size of the bushes. Many advantages would result, the ground could be easily hoed and kept clean, and the crop gathered without injuring the bushes. If, as the natives almost invariably do, light crops are sown in the same field, they, by being also sown in rows, could be easily kept from injuring the cotton plants, either during their growth or while reaping them. The bushes would have room to grow to their full size, and produce individually much more cotton with less exhaustion to the soil. When well grown, say from two to three feet high, the ends of the branches should be lopped. This operation, by checking vegetation for a few days and allowing the plants some rest and time to harden their young wood, will be followed by a copious supply of new shoots, and, as they alone bear flowers, a greatly augmented crop. After the crop is gathered, vegetation should as much as possible be checked. The easiest way to effect this is to strip the bushes of their leaves, by eating them down with sheep or cattle, by which the ground is at the same time manured, and then cut down the stumps almost to the ground in imitation of the Persian method. The roots are thus saved from the exhausting efforts they otherwise make to support vegetation in the stem during an unfavourable season, after the previous exertion of maturing a crop. In this way they may last many years, and allow besides a good crop of grain to be reaped annually from the same ground.

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* "The shrub cultivated as an annual at Malta, under the incorrect title of *Gossypium herbaceum*, may under certain circumstances last for several years. Thus the cotton-growers at Motril in Spain raised many of their cotton plantations from Maltese seeds, and yet they found the shrubs live for six or even ten years. This change of the longevity of the plant is partly due to husbandry and partly to climate." *Ure, vol.* 1, *p.* 58-59.

With respect to cleaning, it may be observed that the long staple cottons are easily separated from the seeds usually, and it is best done by the roller machine, which does not injure its delicate fibres. The short staples, on the contrary, are very difficult to clean, and for them the saw gin will be found by far the most economical method of proceeding, their fibres being so strong as not to suffer, or but slightly, from its rough operation. Our country white cottons, especially the finer sorts, are allied to the long staples, and like them are seriously injured by the saw. The nankin or red cotton, a short staple, and perhaps some of the coarser whites, will bear it well. For freeing fine Bourbon I would recommend caution in its application, as I think there is much reason to fear its doing harm, and if used at all, should have a slower motion than in cleaning short staples.

The following suggestions for an experimental enquiry having been written before these memoranda were even thought of, will account for the occasional repetitions which I have not thought necessary to change.

An opinion has long prevailed among cotton cultivators, that the plant must not be removed from the spot on which the seed germinated, nor even the soil be hoed or loosened to such a depth as to injure or interfere with its delicate fibrous roots, under the supposition that such removal or injury will certainly destroy the plant. This opinion being contrary to all analogy with the rest of the vegetable kingdom, and at variance with some well known facts, such as the ploughing of cotton fields when the plant is a month old, to clean the ground and thin out the superfluous plants, currently practised in this country, it is desirable to ascertain whether or not it is altogether founded on speculation. As a question of vegetable physiology it is interesting, but, in an agricultural point of view, it becomes one of great importance, especially to this country, where the cotton cultivation is so dependent on the regular periodical changes of the monsoons, as materially to interfere with any deviations from the usual routine of culture we may wish to adopt not having reference to these changes.

For example, the seed is usually sown after the first burst of the monsoon is over, and long before the plants are full grown the dry weather has commenced, and is far advanced when the crop time arrives, whence, owing to the previous operation of protracted drought and heat, vegetation is arrested previous to the plants attaining their full size and strength, to resist the united influence of these agents. In this comparatively stationary condition they begin to blossom, and, there being no regular succession of new shoots to keep up the supply of flowers, soon cease bearing, and give but a small return for the prerious outlay and labour bestowed on their culture. Could not the nterference of art effect a beneficial alteration by so modifying the rowth, as to allow the plants to attain greater maturity previous to lowering, thus fitting them longer to resist the drought and heat of he bearing season, and in an equal ratio increase the produce ?

If the opinion stated above be found correct in practice, the plan I m about to propose for the attainment of this object will fail, but not elieving it well founded, or rather indeed knowing it to be erroneous, t the same time esteeming it a duty incumbent on us to endeavour y every means in our power to augment the produce of the soil, nore especially by teaching the natives improved modes of agriculure, I can have no hesitation in recommending the method for trial; the more so, as the requisite, trials to determine its value, may be nade at a very small expense, and, if successfully, may with an inonsiderable increase of cost and labour lead to greatly augmented returns.

The prevalent practice in the cultivation of cotton is to prepare the ground by repeated ploughings after the first rains have loosened the surface, and wait for sowing, in some districts until the setting in of the petty monsoon in July, in others till October or November, when the first burst of the North East monsoon is past. From five to seven months after, the harvest begins, and lasts from one to two months.

With the view of ascertaining the relative advantages of late and early sowing, I constructed from the district reports the second column of the accompanying table, from which however no very satisfactory conclusion can be drawn, as the differences of seed-time seemingly depend on local variations of season in the different districts. In all, with the exception of Vizagapatam and perhaps Ganjam, the, in my opinion, objectionable system prevails, of allowing the plants to flower without a check before they have obtained sufficient maturity, or their roots have acquired that strength and diffusion, requisite to enable them to resist the drought of the dry season.

The method by which I propose to obviate this objection is the introduction of transplanting, a system so generally prevalent in native agriculture, and its advantages so well known, that it is not likely to meet frivolous or unsubstantial opposition.

In herbaceous vegetables "transplanting has the effect of increasing the proportion of fibrous relatively to their ramose roots, by which it is found to increase the size and succulency of their leaves, flowers and fruit." I anticipate other advantages. I think it will produce hardier and stronger plants by the check to vegetation which it will cause, allowing time for the first layer of wood to harden, and by conferring on the plants a somewhat biennial character, cause a larger formation of new shoots, on which the crop depends, and with them the production of cotton at an earlier stage of the hot season (while the ground is yet moist), a prolonged harvest, and an augmented crop.

The plan I am pursuing, in a series of experiments undertaken with the view of determining the probable success of the method, is, that of sowing the seed in beds, from which they are afterwards to be transplanted into the open ground with the first favourable change of weather. In my experiments I fear it will turn out that the sowing was too early (end of March and beginning of April), and that the plants will have attained an inconvenient size before such a change can be anticipated, but I imagine from a month to six weeks old, will be found a good age for removal. In transplanting, one of two methods might be adopted, especially where the English plough is in use, namely, either by laying the plants in deep furrows (the root should be extended its full length) four feet apart, or by the holing system. The holes should be two or three feet distant and six or eight inches deep, equal to the full length of the root. In this way they would be planted regularly, and at such distances as to permit free access for weeding, hoeing and gathering, without injuring the bushes, while they would be prevented choaking each other, and injuriously exhausting the soil by being too thickly sown.

In most parts of the country it is the native practice to sow grain among the cotton plants, and it is said without injuring the cotton crop. Should this, on careful comparative trials, be found not injurious, the practice would be greatly facilitated by the transplanting system. Green crops of the larger kinds of dry grain might be very conveniently taken and dried, and stored like hay for provender ; the want of which in most cotton countries is much felt, while it is known that no kind of dry forage is more nutritious or more relished by cattle. The cotton itself might also be expected to prove better in quality, as well as more in quantity, from being the produce of vigorous and well matured plants.

These sanguine expectations are, it must be confessed, in a great degree, but not altogether, speculative, for in the Vizagapatam collectorate, where liberal pruning is practised, the return is much greater than in any other district. This operation acts much in the same way, by, in the first instance, checking vegetation, which is followed by the production of numerous new shoots and abundance of flowers. There the annual cotton plants, when about three months old, are freely pruned, while the bushes of the triennial sort are cut down nearly to the ground the second and third years, and the produce is said to amount to 46 maunds or 1150 lbs. of seed cotton per acre, nearly equal to the best, and exceeding the ordinary, American crops. In Ganjam the same course, though not stated, seems to be pursued, since the amount of produce is the same,* though the soil is thought inferior, while in Trichinopoly, the next highest, with a fertile soil, 31 maunds 8 lbs., or 783 lbs., is the greatest return, which, though so much less than the above, is still more than double the average return from the neighbouring districts of Tanjore, Salem, Coimbatore, Madura and Tinnevelly. The agricultural processes are not detailed. From N. Arcot, Bellary, and Cuddapah, the two last the principal cotton districts of the peninsula, no reports have yet been received.

A slight inspection of the table will show that, in selecting the time for entering on the experiments here proposed, we are not to be guided by the Calendar, but by the local variations of the seasons, the principal of them being, to have well grown plants ready to transplant at what is now the usual season of sowing, with the view of ensuring a continued production of new shoots and flowers through a period of several months, an effect, that will be still further secured by occasional topping the extreme branches during the operations of weeding and hoeing.

Hitherto I have supposed the annual varieties the ones under trial, though I consider the plan equally, or rather more applicable to the foreign sorts. But with respect to them something more may be done. In the districts where the Bourbon and American kinds are in cultivation, I would recommend that one or two fields, which have already produced their usual rotation, and are about to be ploughed up, should be opened to the grazing of cattle and sheep, and when they have taken all they can get from them, to have the woody stems cut down to the roots, the land well ploughed between the rows, and then left to produce a fresh crop of shoots on the return of the rains. The fourth crop of Bourbon cotton from the same roots is now usually considered scarcely worth the trouble of collection, and the American is cultivated as an annual, but might thus I apprehend be rendered biennial, or even perennial. In Persia we are told that the practice here recommended is annually practised, and that the same plants so treated, last many years (20 or 30), the land every season producing besides a crop of grain. If in this way we can get only one or two additional good crops from the same roots, a great saving would be effected, as it must cost much less to plough and manure the ground in this way, than to root out the old plants, allow it to lie fallow for a season, and then re-sow. The great size, and the depth to which the ramose roots must have previously penetrated, will have placed the greater part of them beyond the reach of injury from the plough, and the new fresh manured soil with which the more superficial series will be brought in contact, will draw from them an abundant supply of absorbing fibrous ones. The Persian practice seems to confirm the American belief, that cotton is not an exhausting crop, and that the rotation crop taken there every third year, is not so much to relieve the land as to prevent a disposition which cotton has to generate insects and blight, which in Persia the annual crop of grain seems to obviate.

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* The collector has since informed me that this is a mistake, originating in the uncleaned or seed cotton having by an oversight been noted in the column for cleaned.

It seems of importance to ascertain whether a practice such as here recommended can be introduced successfully, since it might be the means of establishing more extensively the method of pruning, which I have already shown to be so advantageously adopted in the Vizagapatam district, but which in other districts is scarcely if at all known, by proving to demonstration, that so far from being injurious to the plant, that it may be boldly cut down to the root with evident advantage. To this it may be added, that if the country cotton plant was so cut down after gathering the crop, and the roots relieved from the exhausting and destructive effort to support vegetation in the stems, at a most unfavourable season, that they might be made to produce a succession of remunerating crops, allowing the ground at the same time, to be as freely employed for the production of annual crops of grain, while the new stems of the cotton plant are growing, as if nothing else was there; thereby, as has been done in Persia, Spain, Sicily and the Levant, in all of which, the same species seems to be the one cultivated, changing the constitution and habit of the plant from that of a small annual to a perennial.

In submitting these hints, with the view of requesting the aid of the Revenue Officers to carry into effect the required experiments to determine their value, it does not appear advisable that they should be undertaken on an expensive scale; such a proceeding is not necessary to establish the principle if correct, and failure in such a case might be productive of serious injury, by discouraging further attempts at improvement.

The method I am pursuing is to sow samples of a variety of different kinds of seed (communicated by the Madras Agricultural Society) in beds eight or ten feet square. The plants, with the exception of a few to be left for comparison, will be planted out when the rains set in. In all other respects the usual methods of agriculture will be adopted, and the result carefully noted.

In preparing the seeds they were soaked in water ten or twelve hours previous to sowing, a proceeding which probably tended to make them vegetate quicker, but is not necessary. Of the kinds sown, were two samples of Sea Island, one received in 1836, the other 1837; the former entirely failed, while nearly every seed of the latter has vegetated: two samples of New Orleans marked 1836 and 1837; the latter has entirely failed, the former succeeded: two samples of Upland Georgia, 1836 and 1837; the former has partially failed; one of Bourbon succeeded perfectly. One of Egyptian 1837, entirely failed; a few seeds of Egyptian, communicated by Mr. Liddell from plants raised in his garden, some with downy, others with smooth seeds, both have vegetated: a few seeds of Pernambuco (?) gathered by myself from a tree in Bangalore, all vegetated. These examples show that much disappointment may be prevented by thus testing all foreign supplies of seed, before sowing them on a large scale.

The soil in which they are sown is a light grey sandy loam, the soil in which they are afterwards to be planted is of the same kind. But, to do justice to such an experiment, different soils should be selected, not only for the different kinds, but for each kind, as some may succeed well in some soils and fail in others. It is already known that the Bourbon and American varieties thrive in red, sandy, calcarious, also in light sandy grey, and in alluvial, soils, but altogether fail in the black cotton soils, which the country variety prefers. The Sea Island and Upland Georgia have been successfully tried on the saline sandy soils of the coast, both at Bimlipatam and Ingeram (at the latter of which places, the Bourbon had previously signally failed), and produced an abundant crop of fine cotton. The coast soils generally contain a considerable admixture of calcarious and saline matter. Such are the soils of the Sea-Islands, and so tenacious is that kind of proximity to the coast, or as it is said in America of a "saline atmosphere," that much of its good qualities are lost by removal twenty or thirty miles inland. On such, therefore, our experiments ought to be most extensively (but not exclusively) tried, and such being in some degree the character of my garden soil, it is from that and the New Orleans I anticipate the greatest success. The Bourbon however also succeeds well in grey sandy soils, as I had an opportunity of observing at Bangalore, where it seems to thrive exceedingly well.

In conclusion, I beg to add that the experiments ought not to be exclusively under the management of Europeans, neither ought the poorer ryots to be called upon to take a share in them, unless ensured against loss, but as many as possible of the wealthy and intelligent native proprietors of every district, who can be made to understand the object and principle of them, should be invited to assist in them, as their (the native proprietors') success will prove a much more satisfactory standard of comparison and means of encouragement to the poorer classes, for whose benefit principally they are undertaken, than that of Europeans, however conclusive, and will tend much more to diffuse a knowledge of the plan, and its advantages, if any, by giving them constant opportunities of examining the progress of the experiments in all their stages, and forming a correct estimate of the benefits likely to accrue. This they could not have, if confined to the gardens and compounds of Europeans. But they ought to be made simultaneously in both situations, for success in the one may demonstrate satisfactorily the causes of failure, should such happen, in the other, and suggest such repetitions and modifications in the successive steps of the experiments, as may finally lead to the most triumphant results, by eliciting information of the greatest value, towards improving both the quantity and quality of this most invaluable of vegetable productions.

There is another point of view, in which it is necessary to consider this proposal. One of the prominent defects of Indian agriculture is their neglecting to change the seed from time to time. Seed of the same stock is sown year after year on the same grounds, apparently in absolute ignorance of the advantages to be derived from change, and which is no where greater than in cotton cultivation; hence, we never hear of interchange of seed between different districts forming any part of the agricultural code of the Hindoos, but is one, which it is most desirable to establish, by proving experimentally its benefits. Spain, Italy, Sicily and Malta, each supplies itself with seed from its neighbour, and all benefit, though there is every reason to believe they were all supplied from the same original stock. Here it is probable the transplanting method will usefully come into play, for if finer and stronger plants are so reared, analogy teaches us that their seed will, even under the ordinary treatment, give a finer produce, and in this way advantage may be taken of the plan, intermediately, to improve the staple, even should it be found in other respects inapplicable to practice from the cost exceeding the profit.

In these remarks novelty is not aimed at: the practices recommended having all been successfully tried in different situations and circumstances; my object has been, merely to endeavour to reduce them to principles, under the idea that isolated facts, however valuable in themselves, never carry the same weight that they do when combined by a leading theory into a system. To lay the foundation of such a system is my wish, that I have yet even partially succeeded I am far from thinking, our disjointed materials being inadequate to the work, but if no other advantage results than that of proving the principles I have assumed inapplicable to practice, one step has been made towards ultimate success; and in the mean time, I shall continue the investigation which is here commenced, in the hope of ere long being able to produce a more satisfactory exposition of the principles which should guide us in cotton agriculture, than was possible within my present contracted limits.

ABSTRACT OF DISTRICT REPORTS.

GANJAM.—Method of cultivation not mentioned. Very little cotton is raised in this district, and would have been supposed of inferior quality, had it not produced much of the thread from which the Chicacole muslins are fabricated. The nature of the soil is said to be inferior for this kind of culture, and therefore that it would not be advisable to encourage the growth of cotton. This opinion is not borne out by the tabular return, and it seems probable, from the greatness of the produce (46 maunds of seed-cotton per acre), that, though the country cotton may be somewhat inferior, the American cottons may be profitably introduced.

VIZAGAPATAM.—Three kinds of cotton are cultivated in this district, namely, annual early white, triennial white, and red cotton. After the usual ploughing and manuring, the first is sown in June when the rains set in—when three feet high the tops of the branches are cropped—in the third month pods are produced, and in the fourth gathering commences and continues about forty days. 2d. The triennial white. This is esteemed the best, it is sown in alluvial soils near hills in June—the gathering commences in December and continues four months. The plants are afterwards cut down nearly to the ground, and when the petty monsoon begins the ground is well ploughed and manured, and sometimes a crop of light grain reaped before the cotton harvest begins. This process is repeated the second and third year, during both of which the plants are in full bearing. It is not stated whether, as in Coimbatore, two crops are gathered annually. 3d. The red cotton is sown on *ravutty* soil (described as sweetish), previously well ploughed, from September to the middle of October, in rows about a foot distant. When the plants are about a foot high, the ground is harrowed two or three times a week, and afterwards ploughed with a peculiar plough, called *goontroakah*, between the rows. They begin to bear in the sixth month, and continue bearing three months.

The peculiarity of culture in this district is the system of pruning, which, if the following statement is correct, is most advantageous. Of white cotton, a veesum of land, consisting of four coontahs, each forty-two feet square (= 7056 square feet or somewhat less than 1-6th of an acre), is said to produce 30, and, if on well manured *gooraopah* soil, even 40 maunds of seed-cotton. There must surely be some error here, as the district table gives 46 in place of 180 maunds to the acre, which this statement if correctly calculated implies. Some Sea Island and Upland Georgia seed, sown in gardens, succeeded well and produced fine cotton—these ought to be encouraged, especially the former, for coast culture, being easily cleaned and the method of cultivating triennial cotton being, there is reason to believe, equally applicable to it.

RAJAHMUNDRY.—Two kinds of country cotton are in cultivation, the white and red. The white is sown in well prepared rich black soil, and may be repeated annually, together with paddy seeds and coondooloo (cholum ?), early in June. The field is then ploughed again, to bring the seeds into regular rows, and harrowed with hurdles to level it, and afterwards weeded several times. The gathering is in March, April and May, the produce is about 12 maunds of seed-cotton per acre. The same plants often produce a second but inferior crop, and are said not to be injured by much rain. This seems to be a very unusual variety, and might be successfully tried on the Malabar Coast, the cotton plant rarely admitting of cultivation on soils capable of producing paddy, unless in the instance where the latter is grown in trenches dug between beds for the purpose of draining the soil intended for the other, which does not seem to be the case here, at least it is not so mentioned.

Red cotton.—This is sown in a waxy soil (stiffish clay ?), previously well ploughed—completely sandy ones do not answer. This kind of soil pays an assessment of only 2¼, while the black pays about 6 rupees the acre. The sowing commences in October in furrows 8 (3 ?) to one fathom, the seeds about three inches apart. When about eighteen inches high, the ground is weeded, and the operation several times repeated, till April, when the harvest begins. In fair seasons the produce is about 20 maunds, or 500lbs. of seed-cotton per acre, which, at the rate of sixteen rupees per candy, leaves a profit of ten rupees to the cultivator.

This variety seems well suited for culture in the hottest and most arid tracts of the interior, from its astonishing power of resisting heat and drought. The produce being always great in proportion to the continuance and intensity of the hot land winds, but does not give a second crop. It is afterwards stated the rows are two feet apart. I presume the latter is correct.

GUNTOOR.—In this district drill husbandry is adopted in the cultivation of cotton. Country cotton is sown in preference in black soils, but is not confined to them—the rows are about four feet apart, and the plants from one and half to two. The same methods and soils were tried for American and Bourbon cottons, but both failed, principally it is supposed owing to the heat and want of rain that season, but perhaps partly also owing to the injudicious selection of soil. Contrary to what takes place in Rajahmundry, the sea breezes are said to cherish and improve the plant, while it shrinks under the stroke of land winds and fails to give its crop. An interchange of seeds might benefit both.

The sowing takes place in August and September, the gathering commences in February, and is over by the end of March. It seems very desirable to repeat the trials with American and Bourbon cotton, the former on the calcarious saline soils of the coast, the latter on the gravelly and loamy ones of the interior.

MASULIPATAM—NELLORE—TANJORE.—Neither of these being to any onsiderable extent cotton producing districts, the reports from them fford no information respecting the cultivation of the little that is pro-uced. Nellore derives most of the cotton required for the supply of s manufactures from the Ceded Districts.

TRICHINOPOLY.—At the date of the report from this district the cultiation of Bourbon cotton was rapidly extending, and promised soon to ecome general in those parts of the district that afforded suitable soils. t had altogether failed in the black soils, but succeeded well in reddish amy sandy ones. Of country cotton two kinds are cultivated, oopum urthee and laudum purthee (no explanation are given of these terms, ut I presume they mean the annual and triennial cottons, purthee eaning seed-cotton). The former is a coarse inferior sort, cultivated n black soils. The seeds are sown in November and December, and he gathering takes place in April and May. The latter is raised in oth black and red soils and is of fine quality. It is sown in July and ugust and gathered in December and January, and sometimes produces second crop. It is frequently mixed with other dry crops. It does ot appear that the large produce of this district is in any respect inlebted to superior husbandry, as no account is given of the plan pursued.

SALEM.—The cultivation of both American and Bourbon cottons have been successfully introduced into this district, especially the latter, but it appears to me is still far from having attained perfection. This being so completely an inland district, the Upland American varieties only can be expected fully to succeed. The Sea Island and other coast varieties being so sensitive to removal from the coast, probably from requiring a soil strongly impregnated with saline matter, that they immediately deteriorate on being carried inland, will most likely fail, but should certainly be tried. The country cottons of this district are good, but afford only the moderate return of about 3 rupees per acre to the cultivator. The mode of culture, it would appear, presents nothing peculiar with respect to country cotton; for Bourbon cotton Mr. Fischer recommends the best red loam soils at a distance from the hills, which he thinks are apt to attract rain and cause dews, which are injurious. The plants produce the best crops the second and third years; pruning has not been practised at any stage. It would I think be worth trying the effect of the Persian plan on some spots both of the second and third years duration. The mixture of light grain crops in the cotton fields is constantly practised, and is said not to injure the cotton crop, but no comparative experiments have been made. The seed is sown in August and September, and the first harvest begins in May.

COIMBATORE.—The very copious agricultural details from this district enable me to give a fuller account of it than of any of the preceding, or rather I should say renders it difficult to give a sufficiently condensed summary. There are several varieties of country cotton cultivated, but I shall confine myself to two, the annual and triennial, or oopum and laudum purthee, the former is cultivated in deep black, the latter in the lighter loamy calcarious soils. In the latter only the American and Bourbon cottons can be cultivated successfully.

. The lands, previously manured, are prepared for the reception of the seed by repeated ploughings, after the first rains in April; but the sowing does not take place until August, September, or even October, according to the setting in of the rains, when, after two or three additional ploughings, it is sown broadcast, the seeds being previously soaked in cow-dung or red earth and water, and dried to prevent them adhering to each other in sowing. When about a month old, the ground is again ploughed with a light plough made without iron on the share, a proof that they are not so tender at this age as usually supposed, which at the same time weeds the ground and thins the superfluous plants. In about another month they are weeded again, after which they are considered sufficiently matured to resist the weather. The same methods are practised with the American and Bourbon cottons. In ordinary seasons the gathering commences in March and continues till the end of April. If rain falls about that time, the plantation is again ploughed and cleared from weeds, and in July and August a second crop is gathered, amounting to about half the first. In January of the second year these processes are repeated, and the two crops gathered as in the first, and again in the third year, after which the plants droop, cease to bear, and are rooted out before the setting in of the North East monsoon. If the soil is black it is re-manured and prepared for a fresh crop of oopum purthee, but if the plantation has been triennial, the land is fallowed or sown with some common light grain. The time for ploughing, sowing and gathering the annual, is the same as for the triennial, plant. Experiments were in progress, at the date of the report, for determining the comparative advantage of row planting, but have not yet been communicated. It seems probable much advantage would accrue from liberal pruning after each crop. The cultivation of Bourbon and American cotton is rapidly extending, and in some talooks has nearly superseded the indigenous triennial; the plan of culture being the same for both, and no advantage obtained on that account, its extension must be solely attributable to its superiority. The collector, Mr. Drury, thinks that if the cost, of conveyance to the coast for exportation was reduced, a further increase would take place, greatly to the advantage of the district.

MADURA.—The cultivation here is the same as that generally pursued elsewhere. The ground is repeatedly ploughed, and manured, in the usual way, by penning sheep on it, and at the setting in of the rains in September and October the sowings commence. The gathering season of the earlier sown is from January until the middle of April, and of the latter from February to May. The produce varies exceedingly in different talooks. In the northern parts of Ramnad it is only about 176 lbs. per acre. In Pallemuddum, another division, it is about 226; while in Terumungalum, the best cotton country of the district, it amounts to 391 lbs. and is of the finest quality, much of it being exported under the denomination of "Fine Tinnevelly," and, as I have been informed by a trader, is among the best exported under that name. Much of the light calcarious soils along the gulph of Manar will probably be found well adapted for the cultivation of American cotton, in which case the facility of export will give it a very decided advantage in bringing it into foreign markets.

TINNEVELLY.—In this, as in all the other districts, the black soils enjoy the preference for annual country cotton; the lighter loamy ones for triennial. The sowing commences at different seasons. In the north western talooks, between July and September, according to the weather; in the eastern from October to December. Both the Bourbon and American cottons are now cultivated to a considerable extent in this district, in light alluvial, and red, soils, apparently with much success, but the comparative advantages resulting from the foreign and indigenous sorts are only known to the cultivators. There appears, so far as I could discover, no peculiarity in the method of culture of either. It is probable much advantage will be found to result from the introduction of the Sea Island and New Orleans varieties on the coast, as there is every facility in procuring calcarious manure from the abundance of shells and madrepores to be found there. The latter are now sometimes used as a building stone, or burned for mortar, but, pounded, they would perhaps prove even more useful as a manure. Both these kinds may also, I believe, be introduced with success on the Islands off the coast, and thus render these barren wastes profitable farms. I would recommend this hint to the attention of those who have the opportunity of trying the experiment.

P. S.—After the preceding observations were in the printer's hands, I fortunately met with a report of a special committee of the Agricultural and Horticultural Society* of India, detailing a series of experiments, undertaken under its direction to determine the best methods of cultivating the American cottons, and the kind best suited for India. The results are upon the whole unsatisfactory, owing principally, the committee believe, "to our ignorance of the proper seasons for sowing; bad seed; and from the selection of land, rather forced upon the society and wholly unsuited to the growth of cotton, being *too rich* in most places, and *too salt* in others." The committee observe "This fact is so palpable that it hardly requires remark. It has shown itself in every progressive step from sowing the seed, to the last stage of cropping the cotton.

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* Trans. vol. 2, Appendix.

"1st. It has shown itself by the rapidity and luxuriance of vegetation in the production of abundance of wood, leaf, and flower, but little produce.

2d. By an almost unceasing process of blossoming, thereby exhausting the plant before it had attained maturity, and consequently deteriorating the staple in the ratio of excessive bearing.

3d. By the general result of short produce, an invariable sign of too rich and moist a soil.

4th. To another cause your Committee are disposed to ascribe failure, viz. an improper mode of planting."

The Committee also point out that broadcast sowing will not answer with the American plant. That the soil requires to be dug to a great depth, about 18 inches, the tap root extending nearly that length, and, if obstructed, checking its growth. This precaution cannot be so necessary in the light sandy soils I have recommended, as in the clay one of Akra, but, when cotton is cultivated in the best manner, must always be attended to. Transplanting was tried on one occasion, but without any beneficial result. The following paragraph I quote entire, as affording so pointed a confirmation from experience, of the plan I had advocated from analogy, and which will I trust be frequently tried, so as to leave no doubt of the advantages likely to flow from a systematic adoption of it in all kinds of cotton cultivation, to which experience may prove it applicable.

"Your Committee would beg your special attention to the following paragraph from Mr. De Verinne's letter to the officiating Secretary, dated Surdah, 5th August, 1835: "The out-turn of the last season 1832-33, shows a more favourable result, as 60 maunds of clean cotton and 180 maunds of cotton-seed, were gathered at the farm from December 1832, to May 1833. It must be recollected that the greater part of this cotton and seed was produced from 90 beegahs and 9½ cottahs of Upland Georgia cotton cultivation, sown the previous season, the stumps of which only were left after the severe hail storm of the 25th and 26th March, 1832; these stumps threw out fresh shoots during the rainy season of that year; were partially pruned, and well hoed up at the conclusion of the rains, and yielded from December to

May, 12,968 lbs. of cotton, including seed, making an average per beegah (of 120[*] square feet), 144 lbs., which cotton after having been separated from the seed, gave 40½ lbs. of clean cotton, and 103½ lbs. of seed."

"The only tolerable crop in point of quantity (for the quality of the Upland Georgia cotton has been already declared excellent) has therefore been derived from the stumps of plants of the previous year, destroyed by the storm, and this simple fact involves a question of great importance, viz. *whether this description of cotton might not be more successfully cultivated as a perennial plant, under a course of treatment similar to that which Mr. Bruce describes as followed in Persia; where, after the goats and sheep have been allowed to browse freely upon the plants (after crop), the peasantry are permitted to complete the work of spoliation by breaking off the remaining branches to the root.*"

"The hail storm which occurred, and did so much damage to the plant in 1831-32, was the means of providing us with a tolerable crop in 1832-33; and really seems to point at the Persian *method, as an example* for others to follow in India."

The Committee strongly recommend the introduction of the Upland Georgia on an extensive scale, as affording cotton of as fine a quality as that produced in America from the same sort.

Regarding the table which accompanies, the following explanation of its objects and contents may prove useful. The first eight columns show the kind, the average produce, charges, and cultivator's profit on an acre of ground under cotton cultivation, also the time of sowing and gathering in each district: the ninth exhibits the number of square feet required in each to produce one pound of seed-cotton, calculated at the rate of 43,560 square feet per acre and 25-lbs. per maund. This method of examining the subject by bringing it better within the grasp of the understanding, and more forcibly contrasting the rate of produce, enables us to form a more correct estimate of their respective advantages and fertilities, and of the degree of encouragement that should be given to any particular kind of cultivation in each. The next four columns exhibit the agricultural charges, assessment, and profit on an acre of rice cultivation, and the number of square feet required to produce a pound of paddy at the rate of 23½-lbs. per mercal. The remaining four columns refer to dry grain crops. The numerous blanks in the last two sets originate in omissions of the district returns.

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[*] This is surely a mistake, as it seems utterly impossible that nearly 58,000 lbs. of seed-cotton could be produced on a patch of ground the usual out-turn of which rarely exceeds 500 lbs., and which is said to produce an immense crop when it amounts to 1,000 lbs. At the rate of 14,000 square feet to the beegah 144 lbs. is equal to 1 lb. to 100 sq. feet and not 1¼ lb. to the square foot.

I have experienced much difficulty in the construction of this table, from the prevalent, but not commendable practice among the Revenue Officers, of employing in their reports, under their local denominations, the weights and measures of their respective districts, often without appending any scale by which they can be reduced to the more uniform and better known English standard, whence, it is probable, errors will be found in several of the calculations.

The discrepancies, which the columns of square feet place in such a prominent point of view, are such as to lead to a suspicion that some of the returns are erroneous, for, if not, the obstacles to success in some districts are vastly disproportioned to those of others. As, however, it is by this kind of scrutiny that we are most likely to arrive at satisfactory conclusions, I cannot hesitate to add these columns; the more so, as they suggest an easy method of testing the produce, which may prove of great use in ascertaining the relative productiveness of different portions of districts, and possibly of occasionally relieving the burthens of some who may be over assessed, and equalizing those of others who are under-rated. Nothing can be more easy than its application to grain crops. The produce of a patch of five or ten feet square, of medium fertility, has only to be weighed, or rather measured, and the result, with the requisite allowances for inequalities of soil, watering, &c., applied to a greater or less extent according to local circumstances, will give a nearly correct average for the whole. If to this column I could have added the quantity of water required to irrigate the land during the ripening of a crop of paddy, an important point would have been gained, by enabling us to calculate not only the quantity of paddy annually lost from want of water caused by evaporation from tanks alone, but the value of every tun of water in a reservoir however large; and, lastly, how much we would gain by the substitution of deep and narrow tanks for the broad and shallow ones now in use, after deducting the additional cost of raising the water by artificial means, such as pumps, buckets, &c. worked by windmills, steam engines, or other mechanical contrivances for generating power.

[It is well known that, by an order of Government, dated 1st March 1836, Dr. Wight, the able and zealous author of the foregoing remarks, was appointed to enquire into the state of agriculture in Southern India, and to report on the best methods of cultivating cotton, and other most valuable products of this country, with a view to the more complete development of the resources of our Indian Empire; for, unless European skill and science are brought to bear on agricultural or commercial enterprizes, improvements are not likely to be effected. The Minute of Consultation, which accompanied the above named order, was highly creditable to the Madras Government, and contained a just tribute to the talent of Dr. Wight, the result of whose labours will no doubt be evident, in process of time, in the amelioration of agriculture, and in the increase and improved character of the products of the soil.

Science, in modern times, is not made up of abstract speculation and recondite theory, but is applied, in a practical manner, to the every day purposes of life, for the general good of mankind and the advancement of civilization. A visionary search after the philosopher's stone has been discontinued, and the industrious cultivation of the natural faculties, has taught the true secret of transmuting the sordid things of the earth into gold, by that knowledge, an alchemy worth knowing, which multiplies and improves the arts and manufactures, and with them the rational enjoyments and the comforts of life. Thus the applications of science, as well as its theory and principles, are eminently suited to the pages of this Journal, and, in this light, we hail Dr. Wight's contributions as most valuable. If any other argument was necessary to prove their suitableness, we need only adduce the fact of the Royal Asiatic Society having formed a Committee of Agriculture and Commerce, expressly for the furtherance of objects like that which constitutes the subject of this paper; thus declaring (what seems hitherto to have been lamentably lost sight of) that the objects and purposes of an Asiatic literary and scientific institution, are not solely investigations into the literature, antiquities, history, and opinions of Asiatics, but also the infinitely more important one of holding up the lights of European science to dispel the mental and political darkness of the East.

While the labours of Dr. Wight are thus mainly directed, as a public servant, to the improvement of agriculture and commerce, and to the acquisition of a knowledge of the statistics of our empire in India, botanical science is, at the same time, incidentally advanced; for wherever the foot of this ardent botanist is planted, new additions to our flora are

(*See page* 100.)

		COTTON.												
Districts.	Kind of cotton.	Produce with seed per acre.*		Charges.			Assessment.			Profit.			Sown.	Gathered.
		M.	lbs.	R.	A.	P.	R.	A.	P.	R.	A.	P.		
Ganjam......	C. cotton.	15	0	10	0	0	2	8	0	10	0	0	December..	June to September
Vizagapatam	C. cotton.	46	0	18	8	0	14	0	0	12	8	0	June.......	November........
Masulipatam	C. cotton.	8	0	2	11	6	2	11	7	0	8	11	Unknown ..	Unknown.........
Rajahmundry	C. white cotton ..	15	3	4	8	0	6	15	0	0	10	6	June........	March to May.....
Do.	C. red cotton..	20	0	4	8	0	3	0	0	8	8	0	October....	April ....
Guntoor......	C. cotton.	10	0	1	11	8	1	9	8	1	10	8	September..	Feby. to March...
Tanjore......	C. cotton.	16	14	15	7	6	0	7	6	3	8	10	January....	May and June....
Trichinopoly	C. cotton.	31	8	8	6	6	5	5	5	9	14	1	Nov. & Decr.	April and May....
Salem.......	C. cotton.	14	0	6	0	0	5	0	0	3	0	0	June to Sept.	1st crop Feb. March. 2d do. Nov.
Do.	Bourbon cotton ..	15	0	6	8	0	5	0	0	3	8	0	May to Octr.	1st crop Oct. 2d do. Feb. Mar. & Apr.
Coimbatore..	C. cotton.	12	18	5	0	4	1	8	8	2	6	0	October.....	Feb. to Apr. & again in Aug.
Do.	Triennial cotton...	11	12	3	13	11	1	8	8	2	9	5	Aug. to Octr.	1st year Aug. to Sep. 2d do. Feb. to April, 3d do. Aug. to Sept.
Do.	Bourbon cotton..	10	17	3	15	4	1	8	8	3	0	0	ditto ..	
Madura......	C. cotton.	15	15	6	10	8	1	14	7	7	0	11	Octr. & Novr.	Feb. Mar. & April.
Tinnevelly...	C. cotton.	11	3	5	4	0	2	1	7	2	1	8	July to Decr.	January to June...

(1) Black paddy—(2) White paddy—(3) The mean of Shembapeshanum and Caur paddy—

N. B.—The blanks are omissions

Soil.	No. of square feet required to produce 1-lb. of cotton.	Nunjay Grain. Paddy. Charges.	Assessment.	Profit.	No. of square feet required to produce 1-lb of paddy.	Ponjay Grains. A Cumboo—B Jonna—C Tennay. Charges.	Assessment.	Profit.	No. of square feet required to produce 1-lb. of	
	sq. ft.	R. A. P.	R. A. P.	R. A. P.		R. A. P.	R. A. P.	R. A. P.		
nknown.....	$116\frac{1}{6}$	—	—	—	—	—	—	—	—	
nknown.....	$37\frac{7}{8}$	9 14 0	14 0 0	6 2 0	$37\frac{7}{8}$	—	—	—	—	
lack soil....	$217\frac{3}{4}$	4 15 0 4 9 8	4 6 9 7 13 8	1 9 1 6 14 7	120 (1) 72 (2)	3 11 10	4 5 10	1 9 2	180	*(B)*
ditto	$115\frac{1}{2}$	—	—	—	—	—	—	—	—	
axy sandy soil.........	$87\frac{1}{9}$	—	—	—	—	—	—	—	—	
lack soil....	$174\frac{1}{2}$	—	—	—	—	—	—	—	—	
. soil.........	$105\frac{1}{5}$	5 1 8	5 4 9	1 6 11	$65\frac{5}{18}$(3)	1 11 2	1 0 5	0 4 5	33	*(A)*
. soil.........	$55\frac{5}{8}$	—	—	—	—	—	—	—	—	
. soil.........	$124\frac{4}{9}$	9 14 9	7 15 0	2 0 0	$272\frac{1}{16}$	2 12 10	2 2 9	0 2 0	$47\frac{1}{2}$	*(C)*
ed soil......	$116\frac{1}{6}$	—	—	—	—	—	—	—	—	
lack soil....	137	—	—	—	—	2 1 5	1 6 0	0 11 2	$104\frac{31}{48}$	*(A)*
ed loam mixed with limestone and sand.	$151\frac{7}{9}$	—	—	—	—	—	—	—	—	
	$163\frac{1}{7}$	—	—	—	—	—	—	—	—	
lack soil....	$111\frac{11}{16}$	5 4 8	3 15 6	1 2 5	$21\frac{1}{8}$	3 4 4	1 5 11	1 1 4	$35\frac{1}{84}$(5)	*(A)*
lack soil.....	$156\frac{11}{46}$	7 7 0	14 3 0	6 12 0	$10\frac{7}{18}$(4)	3 10 5	2 1 7	0 11 6	$35\frac{1}{5}$	*(A)*

4) The mean of Peshanum and Caur paddy—(5) The mean of six different soils.

he district reports.

made known, and, independent of the advantages enumerated above as accruing to agricultural and commercial operations, the Government is bestowing a great and lasting benefit on science by his employment in his present capacity—which, we earnestly hope, he will be permanently fixed in. This expression of our desire we know will be responded to by the world of Science in Europe, where the exertions of Dr. Wight are most eagerly watched and duly appreciated.

But to return to the paper on the cultivation of cotton. The first part has been sent in the form of a Circular to the Collectors of districts, and the supplement, which has just been communicated to us, will be added thereto.—Editor.]

Supplement.—I have been favoured with two valuable letters from Mr. Fischer of Salem, the only European in these provinces personally engaged on a large scale in cotton agriculture. These letters, so far as they refer to that subject, I have thought it advisable to publish; partly for the sake of the information they convey, and partly on account of the opportunity they furnish of extending my own remarks to some points not touched upon in the foregoing remarks.

"With regard to your Cotton Circular I do not think I have much to say on it. Among the causes of failure of the attempts in 1832-33, you omit to mention two main ones, viz. the improvidence of Government, in keeping the seeds lying in their godowns, until they were almost entirely spoiled, and in distributing them in an injudicious manner. You are besides wrong as to the season for sowing the Bourbon and other finer cottons. They should be sown as soon after the rains of April and May as possible, and may be sown till August; but to do it after that would ensure failure. The Bourbon cotton, and all the American kinds I have tried, yield three crops a year, and last for five or six years. One crop from the April and May rains; a second from the July and August rains, and a third crop after the monsoon. This last is the chief crop—I am speaking of old plants; new plants sown in May do not yield till the following February. The ryots hereabouts do not care about soaking the seed before sowing, but they are particular in cleaning it of its adhering wool.* This is done by mixing it in a thick solution of cow-dung, drying it in the sun, and then rubbing it between the palms of the hands.

"I have been particular in destroying all my Georgian or Upland cotton seed plantations, because I found the plants not so productive as my Bourbon, and the produce not so good in quality, nor so valuable in price. The Sea Island, which I introduced the last three or four years, has got mixed with my Bourbon—indeed I think the two are one and the same kind, and that that grown (in America) is superior from superior culture, soil and climate. Nothing will induce the natives to take more trouble with it in this country than they can possibly help. The Sea Island seed, which I introduced within the last six or eight months, I am taking great pains with, and am keeping it carefully separate."

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* This should be attended to: many of the small quantity of seed sown by me were lost, owing to the woolly fur not having been removed previous to sowing.—R. W.

"I got your letter yesterday, on my return from Mooganoor. To save your next edition of the Cotton Circular from as many errors as possible, I hasten to set you right on two points wherein you err. First, if I said the Georgian cotton did not answer so well with us as the Bourbon, for I forget the terms I used, I did not mean in point of growth, for it grows equally well, but I meant in respect to quantity of produce, and value of said produce in the English market. My Bourbon always sells some pence higher than all the American Uplands, and the Bourbon plant, as far as I have been able to judge from my experience in the interior, and the experiments made by Major Sim at Madras, which were not a few, is a hardier and more productive one than the Georgian. The second point is, that all my experience, and I have Georgian plants of the third generation, in different soils too, is adverse to your notion, that this kind of cotton passes into the Sea Island kind in the course of time,* by change of soil and climate. I can easily conceive that this error arose from the mixing of seeds, which I know it requires great care and trouble to prevent. Nor does my supposition that the Bourbon is degenerated Sea Island at all support such a notion. Why, one has a black smooth seed, and the other a green woolly one, and the quality of their fibres is different. You may be assured the one will no more change into the other, than an European to an Indian, or *vicê versâ*, by change of soil and climate.

"I do not know the Egyptian cotton; without it is that which we did not know in my garden, and which we called vine leaf cotton, from something we saw one day in the Bengal Agricultural and Horticultural Transactions. I send you a little of it in the accompanying packet to tell me if it is so.* If this is Egyptian cotton, it is one of the largest staple I know; the cotton itself is dingy and not very fine, but that may have arisen from my having planted it out of season. We shall see how this year's produce is—I do not know where I got the seed. The plant you may remember is not so shaggy or shrubby as the Bourbon. Finally, my argument is, that, if the Sea Island seed answer with us, as I have ascertained it does, why take the same trouble to introduce an inferior sort, that will introduce a superior one?"

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* Mr. F. has misunderstood my meaning, for, in saying that the two kinds are said to be convertible under certain circumstances, I never for a moment supposed that those suited to change Upland into Sea Island were to be found in Salem. On the contrary, I stated that the very reverse was more likely to happen by the Sea Island deteriorating. That long staple cotton should degenerate, and become short, is not at all wonderful, when sown in an unfavourable soil and climate; neither do I think the other is so in opposite circumstances. We daily meet with such changes, and the whole science of agriculture is founded on the susceptibility of plants to undergo them.

"We do practise the Persian plan you recommend, more or less, according to the zeal and industry of the cultivator, but they all know its value, indeed in most cases it is absolutely necessary."

I the more readily introduce the above extracts, as they afford satisfactory evidence of a progressive improvement in the Salem and Coimbatore districts, in the method of cultivating this valuable plant; as may be seen by contrasting them with the following extracts from some directions drawn up by Mr. Fischer in 1826, and communicated to the then Principal Collector of Coimbatore: a copy of which he gave me some months ago while in Salem.

"The seed should be committed to the ground in the month of August"—"the plants bear in the month of May of the succeeding year, and do not require to be removed for two or three years or more"—"I have endeavoured in vain to prevail upon the natives to prune the plant when a month or two old, and again after the cotton seasons, which I am convinced would be of infinite service to their growth and fertility."

From these extracts it will be perceived that, ten years ago, August was esteemed the best time for sowing. In the interval it has been ascertained that, unless the sowing be completed by August, it will ensure failure, and that the most advantageous season is immediately after the rains, in April and May. This is certainly a point of importance to know, since it appears that much of the failure of the Calcutta Akra farm experiments, was attributed to ignorance of the proper time of sowing.

It does not appear that, in the earlier attempts, more than one crop was gathered annually: three are now currently taken. At that period nothing would induce the ryots to prune after the cotton season; but now it appears they have discovered that the rough, but economical, method of pruning, practised in Persia, is an improvement, and practise it accordingly. Then the plants lasted three years, now they continue five or six years. How far we are indebted to my paper for eliciting these facts I am not prepared to state, nor indeed is that a matter of the slightest importance, so long as we get them; I have therefore only to add, that it will afford me much pleasure to receive many similar communications from all parts of the country, as so many practical confirmations of the justness of the views I had deduced from a careful consideration of broken and detached notices, met with in books, or picked up in conversation.

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* The sample sent is not Egyptian; it looks more like Pernambuco. The true Egyptian is scarcely, if at all, distinguishable from Sea Island; and is supposed to have been imported from America. R. W.

The opinion expressed in such forcible language respecting the effect of change of climate, soil and culture, in changing, not only the quality of the produce, but even the variety that produces it, into another, higher or lower in the scale of perfection, requires some further notice, because it is a point of great practical importance, and one which should be well understood. It is not, therefore, with the little ambition of attempting to controvert an opinion advanced in opposition to one casually expressed by myself, and which is as likely to be wrong as right, but in the hope of holding out inducements to the enterprising to endeavour, by carefully conducted experiments, to improve even our imported varieties, and to direct attention to a mark, by which the uninitiated in the mysteries of selecting cotton, may possibly be enabled to tell when his crops are deteriorating, and when a change of seed has become necessary.

Because the seed of the Uplands are covered with a green down, and the fibre different from that of the Sea Island, which has a smooth seed, it is the opinion of Mr. Fischer that it is next to impossible for the one to pass into the other, under any change of climate, soil and culture that can be applied; while, at the same time, he expresses the opinion that the Bourbon may be deteriorated Sea Island. Following Roxburgh, who supposes that the Bourbon cotton is the West Indian *Gossypium Barbadense*, it follows that both it and the Sea Island are the same species; for the Sea Island was introduced to these islands from the West Indies, hence the change to a more congenial soil has raised an inferior kind in the one case to the first rank, and in the second to the next place, both the Sea Island and Bourbon being superior to the average run of West Indian produce; but in the one, Sea Island, the seeds have become smooth, in the other, they are covered with fur; such at least is the case with all I have seen. Again Mr. Spalding, a careful and observant American cultivator, says, "it may be remarked, however, that short stapled wool is of better quality, when grown near the sea than at a distance * * * that the three long stapled varieties, namely, *sea-islands*, *mains*, and *santees* (local denominations of the three varieties), may each be sub-divided into several other varieties (sub-varieties), which are only distinguishable by the seeds and qualities of the cotton; the first sub-variety is covered entirely with *green* fur, and has a beard of that colour at one end, while the seed of the primary varieties is pure black, but is sometimes wholly or partially covered with white fur."* Here then it appears that neither the absence nor presence of fur, nor its colour, afford any distinctive mark, since all the three smooth seeded varieties of long staple cotton have sub-varieties with woolly seed, the colour of which is sometimes green, sometimes white, while the fibre of the green kinds is different, being considered of inferior quality.

A rather remarkable circumstance, bearing on this point, was presented to my notice the other day. A quantity of smooth Egyptian cotton seed was sown at Madras, a portion of the produce was presented to the Agri-Horticultural Society at its last meeting (5th July), more than one half of which was covered with a thick coat of green fur; of the remainder some seeds were partially covered with the green, some with white, fur, and part quite smooth. The stock of seed from which these were reared was received direct from Egypt, and was nearly all smooth and black. While such changes take place, and with such rapidity that they are completed in a single generation, it is impossible to adopt Mr. F.'s opinion as to the non-convertibility of varieties into each other, especially of superior into inferior; the opposite change might not be so easily effected. Nor would it be safe to answer in the negative the following question of Mr. Seabrook, though I confess I cannot adduce any facts which would enable me to answer it in the affirmative. "May not the seed of the Sea Island cotton have been received from the isle of Bourbon, and may not the Bourbon planters have got the seed of their highly prized cotton from Persia, since it is now known that the Persian is no ways inferior to the Sea Island, except in strength?" Roxburgh, as already stated, supposes the Bourbon cotton to be derived from the West Indies; an opinion in which I confess I am inclined to agree, notwithstanding the West received from the East (as stated by Mr. Seabrook) the genuine cinnamon and mango about the middle of the last century; because it seems exceedingly probable that ships might carry it back in exchange, and it is highly improbable that the produce of the one remote island, would spread rapidly over the numerous and widely separated islands of the West Indies; while nothing is more probable than that it should rapidly spread in Bourbon, where it had been ascertained, by a few trials, that both the soil and climate were most favourable for its extended and profitable cultivation.

However, be that as it may, it seems now most certain that the absence or presence of fur on the seeds, so far from being ceived as a specific distinction, cannot even be admitted as haracteristic of a permanent variety, since it may be produced to great extent in one generation, and it is possible may be removed in ie next. This much I can state from personal observation, that seeds, ken from the same pod, may some be smooth, some partially clothed ith fur, and perhaps will, in the next generation, be found completely co-ered. These facts lead to the suspicion that, in proportion as the taple deteriorates, the fur begins, and that we may thus account for he fur seeded varieties of the Sea Island being less valuable than the mooth ones, and the Egyptian cotton above alluded to, though good, eing inferior to the original stock. I do not presume, in the present tate of our knowledge, to attach more weight to these views than hat of considering them probable conjectures, but yet I think them leserving of attention on the part of the cultivator, because, should uture observation and experiment prove them to be well founded, they fford him a sure criterion, by which he may know when it is necessa-ry to change his seed; as an accession of fur on smooth or very slightly furred varieties will indicate the progress of deterioration; and, *vice versa*, the diminution of fur on the rough seeded ones, may afford the best indication of a congenial soil, climate and mode of culture.

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* I here quote the meaning, not the exact words, of Mr. Spalding.

Before leaving this subject I must again remind the reader, that I am not in possession of facts sufficient to establish the doctrine I have broached, and that these inferences must, for the present, be viewed as mere conjectures, the value of which remains to be determined by future experiment and observation; not conducted in one country only, or on a small scale, but in many, and in no part of the world so favourably as on the Sea Islands. How interesting it would prove to see the short staple, woolly seeded, Uplands, converted, in the course of a few generations, into smooth seeded, long stapled, Sea Islands; and the green seeded sub-varieties restored to their place in the first rank: while we, with careful management, may be able to raise our country cottons to a much higher rank than that they now usually hold in the English market; the improvment being equally marked by a return to smooth seed.

The concluding question of Mr. Fischer's second letter is direct and unanswerable, and in the Salem district his experience of both kinds entitles his opinion to the greatest deference. But, though backed by experience, the only sure guide, in that particular district, we are not yet authorized to adopt it as a general rule, because it has already been shown that at Ingeram the Bourbon entirely failed, while both the Sea Island and Upland Geoigian perfectly succeeded, at least on a small scale. The experience acquired in the Salem, Coimbatore, Mysore, and some of the talooks of the Tinnevelly districts, leave not a doubt of the success with which Bourbon cotton may be cultivated on the red loamy soils with which they abound; but it does not follow that it will equally succeed in the sandy, saline, coast soils (though it has been ascertained to do so in those near the coast containing a considerable admixture of clay), the very ones in which American experience gives us reason to expect the American kinds will thrive best. The determination of this point, therefore, is still an important desideratum in Indian cotton agriculture, as there are thousands of acres along the coast that might be most profitably devoted to that kind of culture. We know that, generally speaking, cotton cannot be successfully cultivated on a wet soil; our information as to the fitness of a very light sandy soil is, on the contrary, very defective. Should experience, however, prove them equally suitable, for the culture of the Bourbon, Sea Island, and Upland Georgian, and the former of these retain in both situations its superiority, there cannot, in all such places, be a question of the propriety of retaining it to the exclusion of the inferior sorts; but it would be premature to come to such a determination at this period of the enquiry: while, at the same time, it is exceedingly desirable that a course of experiment should be entered upon near the coast, for the purpose of determining the fitness of coast soils for this kind of agriculture, which has not hitherto been tried to any considerable extent on them. In America, the advantages of a coast station, for the cultivation of cotton, is strongly insisted upon, and to that circumstance alone much of the superiority of the cotton of the Sea Island district is ascribed. Thus Mr. Spalding declares, "the only essential point is a saline atmosphere, with it, any soil in Georgia or Carolina may produce fine cotton, without it, no soil will."

This is certainly laying down the law in strong terms, more so, I think, than the evidence he adduces in support of it warrants, and I hope much more so than our experience in this country will ever admit, and leaves room to suspect, that he has allowed some pre-conceived notions, respecting an imaginary property of the atmosphere, to mislead his usually correct judgment, and led him to mistake the difference between an atmosphere loaded with saline particles, and a soil impregnated with deliquescent salts, acted on by a simple humid atmosphere, thereby maintaining that moderate degree of moisture requisite for the most perfect development, as an annual, of both the plant and its products.

In India a coast exposure may not be found quite so indispensable to the production of fine cotton. In America the plant is from necessity an annual, being too tender to survive the winter frosts; hence it must pass through the successive stages of its existence in the summer season or during the short period of about seven months.

Our aim, on the contrary, is to counteract this rapid course, and perait the plant to attain a greater degree of maturity before beginning to ear, in the hope by so doing that the quality of the produce may be mproved and augmented, at the same time that the duration of the plant s prolonged. The tendency of the plant to shoot its root straight own into the earth to a considerable depth, where, even in the dryest eason, it enjoys constant humidity and coolness, enables us to accomlish this object, and at once change its habit from annual to perennial. o far as our attempts to cultivate this valuable variety have yet exended, we have not found any soil in India equally congenial with the merican ones, but we certainly ought not to give up the attempt to find similar ones; for, if we succeed, owing to the perennial character of ur plant, we may expect, if such is possible, even better cotton than he original, on the strength of our second and third crops of other perennial kinds, being somewhat better than the first. The light saline oils of the coast, it appears to me, are those most likely to approach he American ones, while, from being more easily penetrable by the roots, they hold out the prospect of being better suited to this kind of culture than the more stiff and clayey ones of the interior, while their saline impregnation will no doubt contribute to aid the so called saline atmosphere, held to be so necessary in America, but which, according to their own showing, is not enough.

Thus it is stated that the cotton plant thrives best in an alluvial soil a little impregnated with salt—that the most productive soils in Louisiana are deeply tinged with red, and well impregnated with salt—in Guiana, salt is considered to promote the growth of the cotton plant, and the old lands are frequently flooded with salt-water. These statements of the value of a saline soil, the existence of which is susceptible of demonstration, afford strong grounds for doubting the doctrine of a saline atmosphere, a questionable property, and lead us to infer, that the superiority of our black soils for the production of cotton is partly attributable to the saline matter with which they are so generally impregnated.

Regarding the experiments, mentioned in the first part of this paper, as in progress in my garden, I may take this opportunity of adding, that, owing to the intervention of some errors, but too apt to occur in first experiments to mar success, they have not hitherto gone on so prosperously as I could have wished. They may, however, be adduced, as affording a striking exemplification of the tenacity of life of the cotton plant, for, though transplanted, in very dry weather, into ground inadequately prepared, scarcely a plant was lost. In the instance of the short stapled American plants, I have failed in accomplishing one of my objects, that of preventing the early flowering, for they are now, though but few of them exceed nine

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these are planted proved on being dug a very stiff
a light loam which I at first supposed; and part of
is I think fairly assignable to its not being sufficiently
before being planted. Another portion of ground, the soil of
is a light sandy loam, remains to be planted, and will still afford
good means of comparison, though not so favourable as if it had been

The following extracts, occasionally considerably abridged from Dr. Ure's work on the cotton manufacture of Great Britain, exhibiting some of the more important points of American cotton agriculture, may prove of use to those so engaged, in a country where that book is as yet but little known.

"The only essential point seems to be a saline atmosphere; with it any soil in Georgia or Carolina may produce fine cotton, without it, no soil will do so." This doctrine seems very questionable, as already explained.

"The preferable time for sowing Sea Island cotton seed is from the 1st to the 15th April." "Any vegetable manure is good for cotton, but it must be applied judiciously, for excessive luxurance renders the fruit scanty." This is on the Sea Islands themselves, and with the view of raising an annual plant, which must have finished its crop before the frosts of November and December have commenced. With us about the same season may equally be found the best for sowing, though not for the same reason. Mr. Fischer's experience leads to this conclusion.

sterous and rainy weather usually occurs, and that, if the plants are not well earthed up, n and destroyed. It is in this month also e their appearance, sometimes to such of acres of plant in the course of two

d from the sun when the plants r roots should be adapted to ng to remove weeds, the ts." "The number of dom exceed six; the eneral, the plants, ches apart—four -one hundred and thir- er acre is considered a good four acres produce about five cwt. n are white, and worth about 10*d.* per , and only worth 5*d.* per pound."

above rules the fields appear to be more crowded ent with deriving the greatest produce from the land, bushes are not cropped, which, by making them spread, in of rising to so great a height, would tend to protect them from he dangerous storms of August. Nothing could be more easy than to op with the finger and thumb the leading shoot of each plant, in the ourse of their various workings, and at once thin out to two or two nd a half feet; labour would be saved, the ground less exhausted by aving only half the number of roots to nourish, and be sooner and etter shaded from the sun; while, from the greatly augmented flower earing surface thus produced, the quantity of flowers and fruit would e proportionately increased, perhaps to the extent of not less than 0 or 25 per cent.

In gathering and packing the cotton for transmission to market, nuch care is bestowed.

"In gathering care must be taken to remove the locks of cotton ithout breaking off any of the dry leaves, and if any fall on the otton before the picker has secured his handful in the bag, they must e carefully separated. In preparing cotton for the market, the seed-otton is first whipped—that is, put into a long conical sloping cage of pen wire or basket work, closed at one end, traversed by a shaft fur-ished with a number of cross bars. The cage is fed by a hopper, hile the shaft is rapidly turned by a crank, or handle, by which the otton is whisked round the cage, till it drops out at the lower open nd, completely freed from any sand or other impurities, which drop out between the bars of the cage—then picked or motted by women—then ginned, lastly, picked again to remove stained portions, broken seeds, &c., and is then finally packed for the market." "The leaves and pods of long staple cotton are smaller than those of the short; the pod of the former opens into three, that of the latter into five." This s far from constant, as the pods of all my short staple cottons have but four segments.

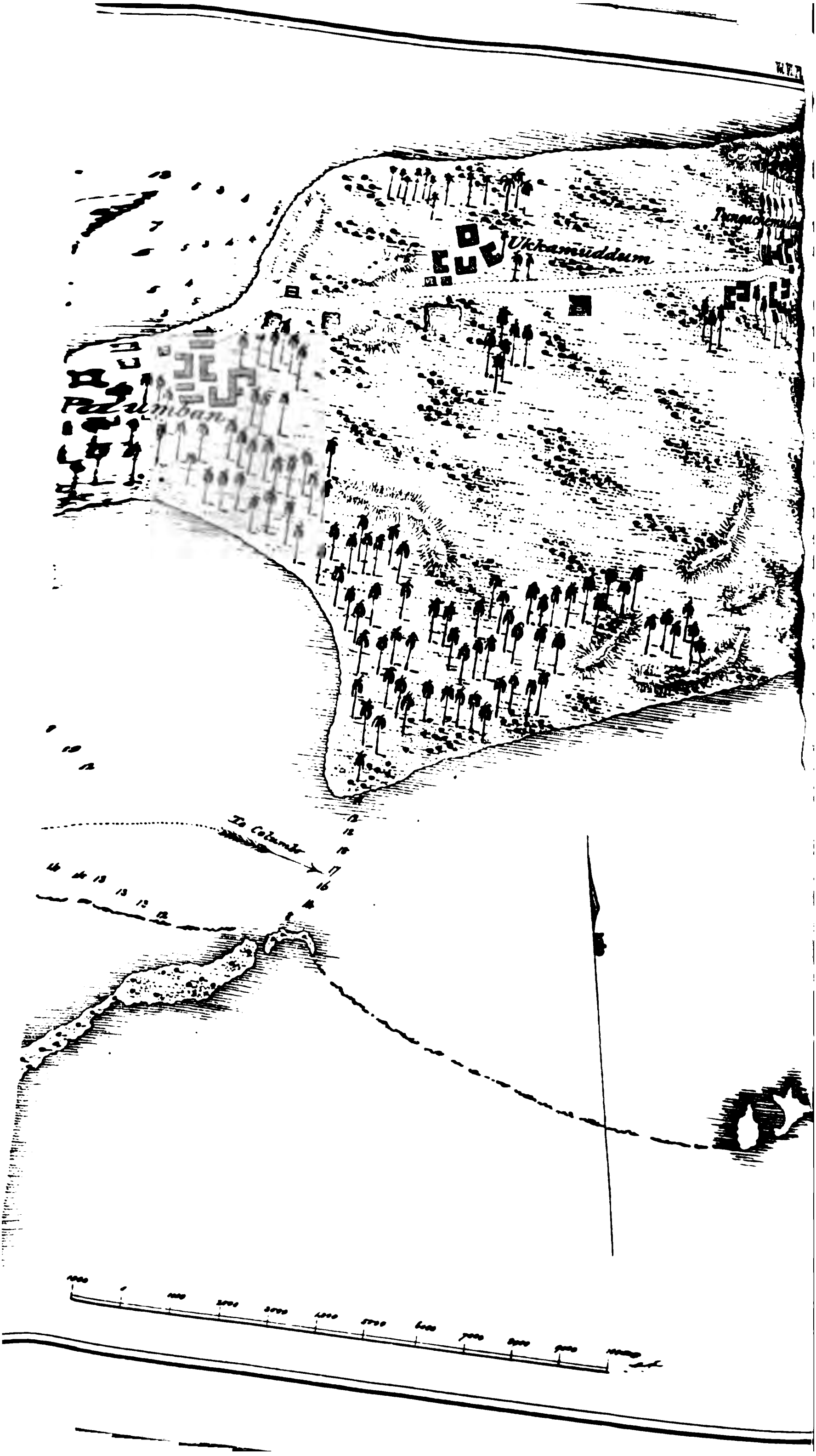
"The cultivation of short stapled cotton is less expensive and less precarious; the winds are not so high in the interior, the valves of the pods do not open so much in ripening, and less is lost by the cotton falling out spontaneously. The short staple pods are allowed to hang on the plants till they are white with wool, so that they may be reaped at one or two gatherings, instead of ten or twelve employed in the Sea Islands, and therefore half the cost of labour."

"It may be remarked, however, that short stapled wool is of better quality, when grown near the sea, than at a distance, and it thrives most luxuriantly in alluvial soils a little impregnated with salt. In Louisiana, between the Arakansa and Red river, the soils are deeply tinged with red, and well seasoned with salt, and give the most abundant crops of the best quality cotton. There the English acre produces about 1000 lbs. seed-cotton, or 250 ginned, while in the hill country, from the Mississippi to the Carolinas, not more than 500 lbs. of seed-cotton can be obtained."

"The average produce for both long and short staples is about 500 lbs. of seed-cotton, or 125 ginned, per acre. Some fields produce double that quantity, but they are exceptions which can never serve as guides to just conclusions, respecting either the wealth or productiveness of the country—the besetting sin of agricultural statements is their exaggerations."

This statement falls more within the bounds of probability than the very exaggerated one of Captain Basil Hall, who informs us that from 12 to 1600 lbs. is the average produce per acre of ground throughout the United States.

In the Indian peninsula, the average produce, in eleven districts, the two principal cotton ones not included, is, for all kinds of cotton, 430 lbs. of seed-cotton per acre. This result is not a great falling off from Mr. Spalding's estimate, when we consider the greater degree of care bestowed on the culture, and the more productive kinds in cultivation; and holds out a strong inducement to us to persevere in the attempts we are making to cope with the Americans, in working this rich mine; the more so, now that that favoured country has supplied us with her own weapons with which to engage in the honourable rivalry, of contending who shall most contribute to the comforts and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conveniences of the rest of mankind, by supplying the means of providing cheap cotton fabrics of every kind and description.

I shall conclude these supplementary observations by extracting from the Transactions of the Agri-Horticultural Society of India, vol. 3, page 132—the following brief account of the mode of cultivating cotton in Egypt, drawn up by Mr. Waghorn.

" Maho cotton is sown in trenches about five feet apart, and four or five seeds in every eighteen inches. If they all spring up, they take out all but one, which they conceive the most healthy.

" It must be sown in a fat soil, a sandy soil will not do. The cotton grounds are situated near the banks of the Nile, or some canal near it, where there is water the whole year. It must be watered every three or four days when it first begins to sprout, and afterwards every ten days. The crop is gathered from June to January, two crops each year from each plant; the plants should be renewed every three years."

X.—*Account of the Operations for widening the Channel of the Pamban Passage in the Gulf of Manar.—By Colonel* W. MONTEITH, K. L. S. *Chief Engineer.*

It has long been earnestly desired by the Government of Madras, as well as by the public at large, that the obstructions to the navigation, which extend across the gulf of Manar, should be removed, or, at any rate, a clear passage opened for the coasting vessels both of Ceylon and India, to enable them to convey the produce of Malabar, Travancore, and some other most fertile districts to Madras, the great point of export, without the delay, risk and expense to which they are at present exposed.

In consequence of the representations made to the Court of Directors by the Right Hon. S. R. Lushington, then governor of Madras, a survey of the generally used passage between the island of Ramisseram and the peninsula of Ramnad was made by the joint efforts of the officers of the Royal Engineers from Ceylon, and Major Sim with a party from Madras. During the year 1828, some experiments were made as to the practicability of improving this channel, and some of the most prominent rocks were removed. The passage was also rendered more direct and easy of access.

The work was, however, discontinued, and orders were received not to renew the attempt, strong doubts having been expressed of ultimate success. The officers' reports were published in 1833, and public attention was again directed to the subject, the experiments ordered to be renewed, and 5,000 rupees granted for this object; with the further assistance of stores from the arsenal, a party of Sappers and Miners and 50 convicts : and I was directed to superintend the work, which is now in active progress, and promises to be successful, as far as the sum allowed can be expected to go; and it is now almost certain that a 12 feet channel can, and will, be obtained at this point, the gulf of Manar having only this depth for a considerable distance.

The following Journal details the operations when I was at Pamban:

Journal.—Feb. 1st 1837.—Embarked on board the native brig *Agamud Buksh*, with 3 serjeants, 1 havildar, 1 private of the sappers, and the stores destined for the experiments at Pamban.

2d.—Anchored at Pondicherry, as there were a great number of passengers for that place, with some cargo, which was engaged to be landed by the evening. Leaving the party on board in charge of the stores, I landed for the purpose of examining the light-house, which I obtained permission to do and take any observation required. It is a plain, but neat, structure, 90 French feet above the level of the sea; the lights fixed, and of good description. It is altogether well adapted for the purpose, but requires a little more ventilation, as the light appears to become dim after some hours burning.

3d.—Embarked at 7 A. M., and soon after weighed anchor.

4th.—At day light off Negapatam, and in the evening took our departure from point Colymere. I directed the serjeant of the watch to see the lead cast every half hour. The first sounding was 5 fathoms, which soon increased to 6, at which it continued for about 15 miles; then to 7, which held till one in the morning, at which time I made the tindal anchor. As we could not be far from land, if the current was as strong as is generally supposed, we came to in 7 fathoms; bottom a strong blue clay, unmixed with either sand or coral. On trial found no current whatever, and the next morning a piece of timber, thrown over during the night, was still near the vessel. Ascertained the latitude by the meridian altitude of a star, and found we were 17 miles from land.

5th.—Weighed at day light, and at 10 A. M. were 3 miles from Pamban. The soundings now rapidly decreased to 5, 4, and 3 fathoms; I called on the tindal to anchor, which he did ; in swinging round the vessel struck violently, and I found we had only 1¼ fathoms at the stern. The vessel was hauled off in an hour, the weather fortunately being very moderate, and by 2 P. M. the stores were all in boats.

6th.—I inspected the detachment, which, with the party I brought, amounted to 1 second Lieut. C. M. Elliott, 5 serjeants, 1 jemadar, 6 non-commissioned officers, 82 sappers, 50 convicts, with some peons belonging to the collector of Madura.

The greater part of these men had been here since the 18th of January, and had been fully employed in the erection of work-shop, store-houses, barracks, an hospital, and huts. The buildings were well adapted for the purpose; the men were allowed to lodge themselves, which was preferable to the plan proposed of providing a barrack, which I had intended, thinking, as this was only a temporary duty, the men might not bring their families.

The building originally intended for the sepoys will become, when finished, available for the lodgment of the convicts. It is advancing very slowly; as we are obliged to bring clay from a distance of two miles, a sufficient party cannot be spared for the purpose. It is not of much importance, the convicts being lodged in a choultry, which is more secure.

Ordered part of a stone-roofed passage in the old fort to be repaired, as a magazine for the gun-powder. Only one sick in the detachment of 90 men.

7th. Examined the country for three miles round to ascertain what materials were procurable: found abundance of dwarf jungle, but the trees, almost entirely *Mimosa*, with branches shooting out at right angles to the stem, which is generally twisted, very difficult to work, and too heavy to form rafts. Lime and free stones plentiful, and near the sea-shore a few palmyras and tamarind trees, with abundance of coco-anut, the only other timber on the island.* Purchased some mango and teak planks from a merchant, and selected eight canoes, to form rafts for the work in the great channel.

8th. Inspected the small channel, and ordered a party to remove some large stones, and another to bore the rock at its northern extremity, which nearly blocks up the passage. Proceeded to the great channel, and ordered it to be correctly marked off by small floats with flags, at intervals of about 30 yards. Before leaving off work, fired two small charges of powder in the two holes that had been finished; one split the rock into small pieces, the other found vent through the bottom, and did little execution.

9th. The buoys were this morning laid down on one side, and anchored with large stones. Purchased two catamarans from a vessel to complete the floats; no light wood being procurable in the neighbourhood. The working party succeeded this day in boring 10 holes in the rocks at the head of the small channel, which were immediately loaded and fired. Charge 8 and 10 oz. of powder, contained in bottles 9 succeeded perfectly, and shattered the rock into small fragments which were easily removed by the hand. The remainder of the men employed in deepening the lower part of the channel. This is the most profitable use to which the labour of the party can be applied, during the time we are waiting for the supplies from Ceylon, and completing our preparations. It is of little less importance than the great channel; all the boats with the cargoes of the vessel pass through it, which they can do in all weathers.

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* Except *Ethee* planted near pagodas, and along the great roads to Ramisseram.

11th. Men employed as yesterday; fired 8 more blasts, a few with increased charges, and the holes at greater intervals; the splinters were thrown to a considerable distance. Large charges can only be employed when the rock is entirely under water. This day some carpenters and smiths offered, and were hired on trial; they had come from Ramisseram and the neighbouring villages. The whether is now variable, with a southerly wind for a few hours in the day, which denotes the calm season. Hastened the work as much as possible, and heard from a vessel which left Colombo three days since, that the Ceylon party were near.

12th. Sunday.

13th. The artificers employed on the rafts and boats. The sappers and convicts in removing the rocks broken by the mines, and in deepening the channel.

14th. Twenty-one sappers employed as yesterday in removing the stones, and the convicts in deepening the channel. Artificers on the boats. The new jail advances slowly, as we can only spare 10 men to work on it.

15th. Party generally employed as yesterday, and 12 more holes bored in the main dam of the small channel. Our success was not equal to the former trials, the match for exploding under water being of an inferior quality. This is the first we had tried of that manufactured at Madrâs, in imitation of the English; some part was made by the Engineer sergeant-major, the rest at the depôt St. Thomas's Mount: eleven out of the twelve failed. The convicts, who had shewn signs of insubordination for some days, positively refused to work in the water. I was obliged to order 12 sappers under arms and secure 6 of the ringleaders, who were slightly punished by the Chouckdar, and the remainder forced to work. The extent of punishment which can be awarded appears to be little understood, and is the cause of the small value of this labour under the Madras establishment.

16th. This day 2 sergeants and 13 men sick, principally trifling accidents and bowel complaints from constant work in the water. The men as yesterday, and 4 trying to extract the charges which had not exploded, but without success. The vessel expected arrived from Ceylon bringing some stores, 8 seamen and a diving-bell.

17th. The raft for working in the great channel was this day finished and launched; it rode well and promises fully to answer the purpose. Eight more charges, fired with the English match, answered perfectly; the others as yesterday failed.

18th. Almost the whole of the men assisting in unloading the stores, and bringing brush wood to lodge the diving-bell on. The shears, constructed with four coco-anut trees, were not strong enough to support the weight; procured some large palmyrah trees, six of which were employed in making another pair of shears—16 holes fired to day, 15 with excellent effect, the match Europe. The main dam is now passable at all times of tide for boats.

19th. Sunday.

20th. Sent a large cargo boat to receive the windlass of the diving-bell, but it went to pieces with the weight. There are no craft here capable of receiving this machine, nor people to work it; being 5 tons in weight, the diving-bell may be said to be unmanageable, and has, I believe, never been used in Ceylon.

21st. Diving-bell raised out of the Ceylon boat and suspended till a bed of fascines, stones and trees could be prepared to receive it. Went to Ramisseram to ascertain what resources it could furnish, in boats or materials, but found little or nothing; the town depends almost entirely on the pagoda, and the pilgrims who visit from India.

22d. Men almost entirely employed with the diving-bell; the stage finished except the palmyra trees.

23d. The bell lowered, and by a mistake of the native officer brought on shore. It is now useless trying to remove it, so it has been allowed to remain till required, or fit boats provided for its reception. It will not be required till near the close of the operations. Ceylon government vessel, the *Wolf*, sailed for the pearl banks.

24th. A new shed was commenced this morning for the blacksmiths; the one they formerly worked in being required for the stores received from Ceylon. The sappers principally employed in enlarging the mouth of the small channel; suspended the work at the jail, not being able to procure clay, and a sufficient party could not be spared to bring it without detriment to more important works.

25th. The rock at the mouth of the little channel had been bored in eight places, and at 11 A. M. the blasting commenced with very good effect; two charges with the Madras match failed, the others succeeded perfectly, and entirely broke the rock, giving an opening of 24 feet to the channel. The charges were this day contained in leather bags of undressed sheep skins, covered with dammer, and are preferable to either the tin, cases or bottles; the expense is also much less than the tin and not so subject to injury in tamping.

26th. Sunday.

27th. This is the first day the sea was sufficiently calm to admit of work being carried on in the great channel, where the raft was anchored, and answered perfectly. Four holes bored in the rock, but not finished before the tide had risen, and the current became too strong to load. Put poles into the holes to mark their position, and returned. The party at the small channel had removed some large fragments of rock with greater ease than before, by means of the windlass received from Ceylon; this also obviates the necessity of the men being any length of time in the water. New work-shop finished, and the second raft nearly completed.

28th. The raft again proceeded to the great channel, and succeeded in boring six more holes in the rock. At 12 o'clock commenced loading but the tide rose so rapidly, and the sea becoming rough, were obliged to postpone the firing till to-morrow. Party on shore erecting a hut for the seamen, and twenty-two men in the small channel, who removed in the course of the day about twenty tons of stones; ten more holes prepared for blasting. The health of the men has appeared to improve; there are at present only six in hospital, a decrease of seven since the middle of the month; they have been less in the water than before.

March 1st. The great raft proceeded to the main channel at seven A. M. and by 11 had seven holes ready for loading; they were instantly charged and fired, six with very good effect; the charges were contained in leather bags, and Bickford's hose burnt with its usual certainty. One failed, from the fuse being cut by a stone, but the powder was taken up on the following day perfectly dry. Another raft was nearly finished; half the party still employed on the small channel, and the convicts in bringing coco-anut trees from some distance.

2d. The breeze was strong from the N. E. and the sea high in the main stream; the decked canoes rode perfectly well, but the progress was slow, as the divers could not work at the bottom owing to the strength of the current; only five holes were bored and three were loaded and fired. The weighing boat brought up some tons of stone, but could not work after 11 A. M, from the force of the current and wind. Fourteen men were permanently attached to the weighing boat; some large stones were brought up with apparent ease, and lashed on the sides, after which they were cut away at about 100 yards from the channel.

Though our progress in the principal object of deepening the main channel has as yet been trifling, in fact is just commenced, the results are such, as to leave no doubt regarding the ultimate success of the work, and, in the mean time, the small channel has been rendered much more practicable than formerly, and, when completed, will be of little less importance than the main one. It is not included in the present project, but forms a necessary part of the undertaking, vessels being subject to more delay, waiting to re-ship their cargoes, than in passing the reef.

Our preparations as regards boats are now nearly complete, to the full extent we will be able to man. We have three rafts and two weighing boats, and expect a small dhoney with two double catamarans from Jaffna, which will require two reliefs, of twenty-four men each, which is about the number available for duty. According to the rate at which we are now progressing, it will take about three or four months (100 or 120 working days), to deepen the channel three or four feet, according to the thickness of the upper strata of rock, which it is proposed entirely to remove, and give a general breadth of forty yards, besides removing a difficult bend in the centre of the channel.

The rock is very easy to work, and on an average one pound of powder breaks two tons, which we have no difficulty in weighing and removing to a distance on the reef. The divers fix the strings to the stones, which are hoisted up and lashed to the sides of the boats, the smaller only being taken on board. The vessel is then hauled off to a distance, and the stones cut away; the largest stone we have yet had occasion to remove has been about 3600-lbs., and took ten minutes to hoist and secure.

I have restricted the present plan to a breadth of forty yards, being nearly what it has at present.

Before more is undertaken, it will be necessary to ascertain what can be done to give a greater depth of water over the horse-shoe bank, which extends from this island to the main land, through which there is said to be only two channels, having ten feet water at the highest tides. The difficulty of passing this is little considered by the native commanders, as the risk is inconsiderable, and the inconvenience only extends to the delay of partly unloading the vessel. There are few crafts drawing more than ten feet frequent this passage, as the inner channel is said to have but twelve feet. I cannot satisfactorily account for the formation of the bar. The quantity of sand carried through is very trifling, and I imagine could not extend so far into the gulf of Manar, when the strength of the currents evidently sets on the east and west shores, where the present passages are found. It is just possible that this may be the ruins of the dam, when carried away by some great storm, a fact still recorded. In this case, not being subject to fluctuation, or any increase from a constant moving body, if once cut through by dredgers, or other means, it would always remain open, the current increasing with the depth of the water, and the bank being composed of coarse sand with fragments of coral and large gravel, totally differing from the small sand on the coasts, would not be subject to fill up. This is rendered probable by our experience in the small channel, no sand having lodged in the part lately excavated.

31. Wind very strong with a high sea; no holes could be bored

from the violent motion of the rafts; the party returned and were sent to the small channel. The weighing boat took up about six tons of stone, but was also obliged to return about noon and joined the party in the small channel. The second raft was launched this morning.

4th. The boats were at their stations in the main channel by 7 A. M. and at 11 A. M. eight holes had been made in the rock, some of which were charged with 8-lbs. of powder. The stock of the English hose being expended, tried that made at Madras, which entirely failed, and we were obliged to have recourse to the tin tubes and portfires. The attempt to fire all at the same moment failed, and only one charge took effect, the tubes of the others being damaged by the concussion; the attempt was therefore given over, and the party returned at 1 P. M. a number of holes being ready in the small channel, directed them to be fired with the match newly received from Madras. It all failed, in a strong current; reprimed with portfires, and exploded the charges in succession. One piece of portfire exploded on being fired and overturned the boat containing six men; fortunately was a small charge, had it happened with a large one, the whole must have been destroyed. A number of large stones removed out of the small channel, which is now used by all light vessels, affording them the means of being dragged against the current.

6th. Loaded twelve holes this day, and again tried the fuse made at Trichinopoly, which failed as before, with one exception, which exploded after 22 minutes; as it was considered to have been extinguished, a diver was sent to recover the case, who returned saying it was still burning. The boat had nearly reached the shore when the explosion took place; no accident occurred. A third raft nearly finished.

7th. Recovered the cases which had been lodged in the mines the day before; powder generally dry. Re-charged 7 others; two of these failed; a small quantity of powder, above what the box could contain, having been allowed to remain in the tubes, they burst before inflaming the charge, and water got in. This is a singular fact which experience could only prove. The effect was good and we may now be considered as fairly at work.

8th. Having received samples of the powder hose from several quarters, made a number of experiments both in and out of water, but found no reliance could be placed on it in either case. With the English, made by Mr. Bickford, in sixty-five trials, not one failure took place that could be fairly attributed to the hose.

9th. Four new holes were ready by 11 A. M., but the current did not allow their being fired till half past twelve, when nine were charged and seven succeeded perfectly, detaching a great quantity of stone. Ordered in future the tin tubes to be dammered, as there were some small defects in the solder which admitted water. To this date the work performed by the convicts was below what ought to have been done.

Directed they should in future be divided into small parties, and the work performed measured previous to dimissal.

10th. The raft proceeded to the main channel, and had made eight holes at seven feet distance, there being already ten; but some had been covered by the explosion of yesterday. Eleven were loaded, but some of the skins and tubes were again found imperfect. Six only took effect, but the powder in the others was preserved. Those made by sergeants Reardon and White were very good, and reflect great credit on their attention and diligenee; a rock of ten tons, which had obstructed the channel, was entirely removed.

11th. Continued the work as yesterday. Eight new holes made, and twelve remained of the former work. Eight were exploded with only one failure occasioned by the match going out. Directed the charges to be diminished on all prominent rocks affording good lines of least resistance, as we found the stone broken into small pieces; fragments of from one to two tons are best for the weighing boats.

13th. Two rafts for boring were now ready and commenced in the morning. This day fired 70-lbs. of powder, in thirteen charges, all of which succeeded admirably.

14th. All the most prominent rocks having been cleared out of the centre of the main channel, directed a cut should be commenced from south to north of twenty feet in breadth and three feet deep. This plan has been adopted to prevent the lodgment of sand in detached holes, which is difficult after to distinguish from the rock; when a certain length is obtained, the current is expected to prevent any lodgment. This day seven hundred and nineteen feet of rock were removed; the work altogether satisfactory.

15th. Fired fifteen charges or 74-lbs. of powder; the effect was greater than we had ever before experienced, several blocks of stone of two and three tons each were torn from the bed and projected several yards from the mines.

16th. This being the Buckreed festival, the Mahomedans had leave, and no divers would work; two parties of convicts this day worked exceedingly well, and did as much as any other men. Six charges only were fired for want of the divers, and all with good effect.

Since my last report our progress has been regular and satisfactory; the men are now accustomed to the work, and perform more than double what they were able to do at first. We formerly raised about 300 cubic feet of stone per day; the return for the last five has shewn 700, and, when the catamarans arrive, will probably be 1000. The maximum I think this party capable of performing.

The experience now gained is sufficient to form a correct estimate of both the expence and time necessary to complete the undertaking, and is not subject to any considerable error, the work being simple, the operations certain, and results known.

The reef, or bed, to be cut through, extends about four hundred yards, from N. to S., double what has been previously stated. The mistake has taken place, from the centre having only five feet at low water, and the flat bed of the rock, both above and below, from six to six and half; vessels being obliged to reduce their depth to five feet water felt no inconvenience from the previous obstacle, but the case will be totally different when the centre reef is removed to ten feet. This is now in progress, and has been gained on in an extent of about eighty yards in length, by twenty feet in breadth, and will be completed to these dimensions, through the whole extent, in one month from the time we have been fully at work.

I have adopted the plan of cutting a narrow channel, through the whole extent in the first instance, rather than working on the breadth, as I found the current swept this long narrow cut, and prevented the lodgment of any substance which might be brought in by the current, whereas the other method only produced a pool for its lodgment. It will also enable the Government to proceed to the extent they may think proper, a positive advantage having been obtained, be the channel broad or narrow. A certain breadth is necessary for the convenient passage even of small vessels, and this season I do not think it can be extended to more than fifty or sixty feet—there being at present about seventy days remaining, if it be certain that work cannot be carried on after May (a fact I do not think yet established). The Government will, I trust, permit the detachment to remain at such a distance as to allow their returning to the work in August, when the season is known to be favourable for two months. It will be a great subject of regret if the object is not now obtained, or if it should be imperfectly executed, when the success is positive and the expence inconsiderable, in comparison with the advantages to be gained. A small party can be left with a non-commissioned officer to take charge of the boats, stores, &c.—they may be the seamen.

17th. This day fired twenty-three charges, in 102-lbs. of powder, with very good effect. The boats carried off 800 feet of stone. The work of the convicts under the boatswain equal to any others.

18th. This being the last day of the Buckreed festival, no work could be done. The few Roman catholic divers we got to replace the others, were not equal to the work; eight holes made by the two rafts and 509 feet of stone removed.

20th. Fired 63-lbs. of powder, in fifteen charges; two failed from the pipes having been cut, and were the remains of what had been fired before; it being necessary to spare as much as possible the tubes, all the country match having failed. The divers and boatmen had not entirely recovered from the effects of the festival. Removed 652 feet of stone.

21st. Only half a day's work was done, as the weighing boat and tackle required repair; fifteen charges fired, and 597 feet of stone removed.

22d. The current was to-day exceedingly strong, and the divers gave up early; six charges were fired, and 350 cubic feet of stone removed.

At day-light proceeded to examine the passage through the sand bank. Its figure, as well as the soundings, do not appear to have varied in the slightest degree since the survey made under Major Sim. The channel is precisely where it then existed, with a depth of five and a half feet at the lowest tides, and about eight high water. It gradually increases to twenty feet, which is found near the shore close to the island of Ramisseram, and the greatest depth close to the edge of the bank on its eastern side; the remainder of this space has seldom more than ten and twelve feet water; bottom, rocks mixed with coarse sand, broken coral, &c. All vessels are obliged to pass over this part. Those proceeding to Ceylon have an open passage, with eighteen feet water; the channel to the coast of India is round the southern extremity of the bank, and has only twelve feet at low tides. Vessels can, however, gain the open sea by the Ceylon passage, which is seldom done except when commanded by Europeans. This route is well sheltered by a chain of coral reefs and islands, which protect it from the S. W. winds. I followed the whole extent of the bank, and found in no place but the one above mentioned more than three and three and a half feet. Near the eastern side, close to Tonitora, the bank is only a few yards in extent. It is said an opening was forced by the storm of 1814 through this point, of equal depth to the other, which gradually closed up, and it is now such as I saw it in the year 1809.

Having thus ascertained that no other passage existed, I returned to the point before mentioned, and commenced a minute examination of its composition. Contrary to the opinion I had previously formed, the centre and most shallow part was composed of fine sand, mixed with blue mud, and covered with marine plants, abounding with insects and sea worms, which would appear to indicate that it never suffers any material change, and is not, according to the reports of the masters of the dhonies, covered with sand to nearly a foot in depth during the S. W. monsoon. I remained on this point till the tide had commenced to flow from the north, running at the rate of nearly five miles an hour over the reef; here the rapidity was trifling, never exceeding one and a half miles per hour, the velocity being lost in the great expanse of water over which it spreads on passing the reef.

This renders it doubtful if the force of the current alone, even with the aid of an embankment, would be sufficient to increase the depth, bound as the soil is by the roots of weeds. An embankment, however, if extended to the shore, would throw a much greater body of water on this point, and if a passage was at the same time opened by dredging, the current would I think be sufficient to prevent its again filling up. The expence of this, beyond the purchase of a dredging machine, and the vessel to work it, would not be great, to save expence the embankment should be made of piles, cut near the spot, and filled up with loaded fascines, also procurable from the thorn trees which cover the whole island, many of which are sufficiently long and straight to answer this purpose of piles; the wood is hard, heavy, and lasts better than teak under water. The crooked timbers of large cargo boats are generally of this wood.

This strikes me as the only plan likely to give a moderately deep passage, without a very heavy expence, and is not liable to any uncertainty but what must exist in the execution of all works exposed to the action of the sea. The extent to be thus excavated is only four hundred yards, and the embankment double; but much of the latter is in very shallow water, where long piles would not be required.

Another plan, suggested by Major Sim, of cutting a canal through the eastern part of the reef, I found liable to much greater uncertainty, though it had a flattering appearance at first view; it would require greater labour than the main channel, and, when completed, be of difficult access.

The improvement of this passage I therefore consider as confined to a depth of twelve feet, high tide, which is, however, a very important object, and can be attained at a moderate cost.

I now proceeded to examine the site fixed on as presenting the greatest facility for the excavation of a canal, and, after following the line of coast for a considerable distance, returned to the spot where the sea forced a passage in 1814, and which is in every respect the best adapted for the purpose. Commencing from the southern side of the cut, I found the sea clear of rocks, and deepening rapidly to eighteen feet, which is obtained at four hundred yards from the shore, and continues till it joins the inner passage to the coast of Madura. This point forms an extensive basin, well sheltered from all winds, where vessels could anchor with safety, and immediately in front of the passage, leading into the open sea, with a depth of eighteen and twenty feet, which increases after passing the chain of islands and reefs to five and eight fathoms; bottom, coral rocks, with a few spots affording anchorage on beds of mud and sand.

The party I left on shore had succeeded in clearing away the thorn bushes, so as to afford an open view of the nullah, which is nearly on a evel with low water, and on some places salt water still stands in pools. The distance across is only two thousand one hundred and thirty feet, nd the soil perfectly easy to work. A canal would therefore be readiy excavated, offering only the difficulty of pumping out the water to ain a depth of eighteen feet below the level of the sea, and would be work of less difficulty than cleaning the ditch of Fort St. George, or ven the canal across the esplanade. The beds of sandstone would ather assist than retard the excavation, and furnish an excellent maerial to line the banks of the canal; a precaution absolutely necessary o prevent its filling up with the sand of which the soil consists. Thus much of the work would therefore be performed with certainty; the expence would be considerable, but still much less than works of this scale and importance generally cost. The most formidable part of the undertaking still remains, viz. continuing the canal into deep water on the northern side, where the rock shelves gradually into twenty feet, at a distance of one thousand two hundred yards, covered with coral in every form, and approaching in some places to within a few feet of the surface. This is, however, a simple question of expence, and not of difficulty; the execution is perfectly easy and certain, with time and means. But I fear that nothing less than piers on each side would effectually protect the canal, or enable vessels to pass along it at all times, and lock gates must be formed at each extremity of the land cut, to prevent a current, and consequently any deposit or passage of sand. Should a small quantity by any means lodge at the mouth of the outer canal, the water retained by the gates, and discharged by means of under sluices, would effectually remove such an obstruction. The appearance of the rock, as also of the coral, would indicate that no such deposit takes place; and, if no current is allowed through the passage, it appears probable, and even certain, that the cause of an accumulation of sand would be prevented.

The only point to be decided is, if, with a channel of twelve feet, which may be obtained at this place, there will remain any object in having another of eighteen. This is a question I am not competent to decide; as it must depend on the importance attached to the commerce of the country, as also regarding the passage of steam vessels or ships of war by the shortest and most practicable route at all seasons.

23d. Both weighing boats in full work, and by 2 P. M. had removed 1130 cubic feet of stone, about 75 tons. The explosions had not so great an effect as usual, having come on a flat bed of rock, extending across the whole channel, affording no weak points from which a line of least resistance could be found; the tamping was generally blown out. Directed the holes should be made five feet deep, quite through the rock, and charged with 12-lbs. of powder each, at intervals of four and five feet.

24th. The holes were not sunk to the required depth, as the divers could not reach the bottom with their hands, and the sand or powdered stone was washed out of the ladles before reaching the top. Directed an auger to be made with a tin tube for this purpose. The work was, however, very good, and 1414 cubic feet of stone removed. The boatswain with the convicts did more work than the sappers, which must be attributed to the excellent superintendence they were under.

25th. The holes were now sunk to the required depth, and one 10-lb. charge fired, which made a crater of about four feet in diameter. The other holes were charged with less, as the rock was found not to be of great thickness; three craters were produced, but the rock was not as usual rent beyond the actual effect of the charges. We regretted much not having it in our power to have simultaneous discharges, which would make a large excavation at once. The present method will be tedious and fatiguing, from the length of time it takes to charge and return to the same spot. The rock is so exceedingly soft it offers little more resistance than clay, so on a perfectly flat body the effect was comparatively trifling; a considerable portion of rock had been detached, and 1524 feet was removed, through the energy of the person before mentioned, boatswain Morris; 103-lbs. of powder expended, in seventeen charges, without a single failure. The leather cases well dammered and dusted with lime, answer better than tin cases, and are of much less cost.

27th. Received a letter from the assistant government agent at Jaffna, and also the boat and machinery for weighing stones. The frame and wheel of this machine are calculated for a boat of double this size, and as much above the centre. It will not answer for stones of any weight, which is much to be regretted, as the machinery is of the best description, and the boat a beautiful model. Removed today 1143 feet of stone, part of the hands being employed on the Jaffna boat.

28th.—The wind has changed decidedly to the south, with more current and sand than we had before experienced, and the water discoloured. Three charges only fired, from the difficulty of finding the holes, but removed 1715 cubic feet of stone, the greatest quantity yet taken up.

29th.—Tried a raft, with a small iron windlass, as a weighing boat, which worked very well, but requires seamen and a European to manage it. Removed 1620 cubic feet of stone, though the current was strong from the south. We had previous to this been principally engaged on the south side of the reef, as being the most sheltered, but now ordered the work to the centre and north. A boat arrived from Colombo, with timber and catamarans, the wood of the latter very spongy, and in an advanced stage of decay. The season is too far dvanced for others to be procured, I have, therefore, taken it and rdered two double catamarans to be formed for receiving the stones rom the weighing boats, and two canoes. The blocks, &c. have enabled ne to increase the power of our machinery, which now requires fewer ands, and has enabled us to spare what is necessary to man the extra umber of boats.

30th. The boats employed as yesterday, and sixteen holes made in he rock ; the boatswain was ill with fever, and his party did not per-orm half the usual duty. I directed they should be kept at work every lay, till the regular quantity was done, and the arrears brought up. Eleven charges were fired with excellent effect—three holes had been ttempted on a rock having only a few inches of thickness, and sand below; they in consequence failed.

31st. The current has been running strong from the south, with no interval of slack water. The divers could not work, but six holes were made; the men having been carried away several times I ordered the boats to return, only two charges were fired after three hours hard work. About 900 cubic feet of stone was raised, a large quantity under such circumstances. Tried the Jaffna weighing boat again, but without success, she was only saved from turning over by the prompt aid of the other boats. The stone attempted to be raised was about 2000-lb. in weight, or a quarter of what had been done by the dhonies and tackles.

The result of this month's work, is, I trust, on the whole, as much as could have been expected, from the many delays we met with in the early part of it. This place affords no facilities, the most common articles had to be procured from a great distance, and not then without the utmost exertion on the part of the people employed.

Pamban is a village of 70 families, composed entirely of boatmen and pilots, who have no other occupation than what is furnished by passing vessels through the reef, loading and discharging their cargoes. There are no artificers, and the bazar consists of a few shops for the sale of provisions only; destitute of the most common articles which are generally to be procured in every other part of the country.

Artificers we had no difficulty in procuring from other places, but, on a sudden call, it was impossible to advance the work by the addition of extra hands.

The total failure of the means provided for under-water explosions, also, was the cause of most serious inconvenience, and obliged me to alter entirely the plan of operations. Our supply of tin tubes would have been expended in a few days, and, neither in this place, nor any where near it, could bamboos or reeds be procured. I was obliged to break up the canisters for containing the charges and substitute leather bottles in their place; this, with collecting the remains of the tubes after the explosions, has hitherto enabled us to continue the work. A supply of gun-powder must be received in a few days, there being but little remaining, which will necessarily stop the work, and a provision has I hope been made for this in time to prevent it.

Nothing, I trust, is now wanting to prove the certainty of success (if prosecuted) of this most important work, and though the extent of rock to be cleared is double what was at first supposed, still the expense will be trifling, in comparison with the advantages derived. If the testimony of the merchants of this part, and the masters of vessels, is to be taken, there is no public work now in progress looked on with more satisfaction than this.

1st April. The jumper, borer and shamrock, the latter a raft formerly used to remove the stones taken up by the windlass on the sapper, were out-boring to-day, with eight parties of sepoys—thirteen holes were made 2' 9" deep. The shamrock is not tarpaulined, but it worked very well. I sent out three catamarans to attend the sapper. The sapper and catamarans returned at 10 A. M., having done nothing. I laid down, at half past three A. M., eight more buoys to the southward, which nearly completes the right side—the total space included between them is 510 yards. Tried the current at half past two P. M.
S. reef 1st trial, feet 120' in inches 50" or $1\frac{5}{8}$ miles per hour nearly.
„ 2d do 120' in do. 45" or $1\frac{9}{11}$ do. do. do.
„ 3d do. do. do. 45" do. do. do.
150 yards N. of N. reef 1st trial, feet 120' in inches 45" or $1\frac{9}{11}$ miles per hour nearly.
300 do. do. 2d do. 65" or $1\frac{4}{11}$ do. do. do.
„ do. do. 3d do. 58" or $1\frac{2}{5}$ do. do. do.
The two dhonies removed 48½ tons of stone, measuring 728 cubic feet.

3d. The sapper, shamrock and borer proceeded to-day to the north of the northern reef. Eight men at the magazine raised one of the stones supporting the roofs, by means of two palmyra props and wedges; there was no foundation on which the props could rest; a stone sleeper was therefore placed at the depth of 5 feet. The two dhonies removed from the channel 43 tons of stone, measuring 730 cubic feet.

4th. There was great difficulty this morning in obtaining any divers. The men were consequently employed till nine A. M. in the small channel. Went out at seven A. M. with six leather cases, with hose attached, lately sent by Captain Cotton; not one went off, but the hose had burnt to the nozle of the cases; there it must have been extinguished, from the suffocating effects of the oil mixed with the resin, and easily absorbed by the powder in the hose. At eleven A. M. fired off a 10-lb. case. The dhonies were not in use to-day.

5th. The borer and jumper were employed on the northern reef, but only made together six holes during the day. The buoys I took so much pains about have lost their distances, and two have had their numbers stolen by the dhonies passing to and fro. The two dhonies with the sapper removed from the channel 1295 cubic feet of stones, weighing 87 tons.

6th. There was no blasting to-day, the jumper and borer proceeded to the northern reef, where they made twelve holes during the day, three feet deep—56 tons of stone were removed from the large channel, measuring 860 cubic feet.

7th. The wall of the new magazine was completed with a doorway; part of the old roof has been removed, being excessively dangerous and constantly threatening to fall—74 tons of stone were removed from the large channel, measuring 1100 cubic feet.

8th. The jumper, shamrock and borer were all out to-day, and sixteen holes were made. The sawyers have been employed in cutting up planks for the paumben out of the pieces of jackwood sent to us from Ceylon. Thirty-eight tons of stone were removed from the channel, measuring 570 cubic feet.

10th. The jumper, borer and shamrock were all out to-day in the large channel. The sawyers continued cutting up plank for the paumben. Eighty-six tons of stone were removed from the large channel, measuring 1290 cubic feet.

11th. The jumper and borer only were employed today—four sepoys were sent to the small channel—seven blasts were fired there today, which had great effect. There are, however, so many stones lying in the bed, as to form a serious obstruction to the larger description of cargo boats. I shall, therefore, use the small dhoney there, if it can be spared from the large channel—68 tons of stone were removed from the large channel, measuring 1040 cubic feet.

12th. As our powder is now nearly out, I am forced to limit the details of parties proceeding to the channel to blast. Twenty men were at the small channel today—the holes were fired off that had already been made. A great quantity of large stones are in the bed of the channel, that it would be necessary to blast, if required to drag them to any distance; but the small dhoney will be able to take them away without this additional trouble. One-hundred tons of stone were removed to-day from the large channel, measuring 1500 cubic feet.

13th. One dhoney was employed in the small channel, and did a great quantity of work; during the day a few more small blasts were fired, and 26 tons of stone were taken away, and out of the large channel 75 tons, measuring 1120 cubic feet. Besides the two dhonies and sapper, that are constantly employed in the large channel, I have lately kept the paumben at work in those places where fragments of stone have been blasted, and of these it takes away three or four heavy raft loads in the course of the day.

14th. The borer and jumper proceeded to the north of the north reef, where eight holes were made. The large dhoney, and sapper, with its tender, and shamrock, were employed on the southern reef, whilst the paumben proceeded to different parts of the channel in search of any loose fragments of stone. A party of sepoys were employed at the small channel with the small dhoney. They removed between them twenty-four tons of stone, whilst seventy tons measuring 1050 cubic feet were taken from the large channel.

15th. The small dhoney was employed at the small channel, and the latter is now quite free from obstructions of any kind. The large dhoney, with the sapper, removed from the main channel fifty tons of stone, measuring 750 cubic feet.

Date.	Time of high water N. side of the reef.	Time of low water S. side of the reef.	Time of low water N. side of the reef.	Diff. between low and high water S. side.	Diff. between high and low water N. side.	Time the current changes from N. to S.	Time the current changes from S. to N.	Height at which current turned from N. to S.	Height at which current turned from S. to N.	Greatest difference of level of two seas.	Remarks.
March 17	12 30 P. M.	9 20 A. M.	9 20 A. M.	7 In.	4 In.	3 15 P. M.	12 10 P. M.	1½ In	3½ In.	7 In.	A slight breeze sprung up at 8 A. M. from the N. E. by N. continued all day.
18	11 15 A. M.	7 10 „	7 34 „	8½	5	4 40 „	10 45 A. M.	2½	4	8½	do. do. N. E. do.
19	1 15 P. M.	8 40 „	9 0 „	10	6½	3 20 „	12 15 P. M.	3	4½	10	do. do. 11 A. M. do. do.
20	1 30 „	8 20 „	8 45 „	12	7½	5 0 „	11 30 A. M.	3	7	12	do. do. 9 A. M. N. E. by N. do.
21	2 30 „	8 0 „	8 20 „	1 11	9	6 15 „	11 5 „	4	10	1 11	A calm till 10 A. M. a slight breeze from the N. E by N. the rest of the day.
22	1 45 „	8 5 „	8 30 „	2 4	11½	6 30 „	10 45 „	4½	12	2 4	A very gentle breeze from the N. E. N. sprung up at 9 A. M. the wind during the morning varied from N. E. to W. by S. A spring tide this day; the current in the large channel running at 4½ knots per hour; small channel 3½ knots.
23	2 30 P. M	8 45 „	9 5 „	2 2½	1 2	6 30 „	11 30 „	7	10 0	2 2½	A slight breeze from the W. during the day.
24	3 45 „	9 10 „	9 30 „	2 9	12 0	6 15 A. M.	1 0 P. M.	7	1 4	2 9	do. do. N. the morning rather cloudy some appearance of rain.
25	3 20 „	9 0 „	9 30 „	2 11	1 5½	7 20 „	1 20 „	4	1 3	2 10	do. N. at low water the current in the small channel was running at 2¾ knots per hour.
26	4 20 „	9 10 „	9 30 „	2 7½	1 7	7 35 „	1 30 „	4	1 4½	2 7½	The wind has been very unsettled to-day, varying from N. E. to W.
27	5 0 „	9 45 „	10 20 „	2 5	1 5½	8 5 „	1 0 „	4	1 3	2 5	do. do. do. a few drops of rain at noon.
28	4 30 „	9 50 „	9 30 „	2 3	1 5	7 30 „	2 30 „	3	1 1	2 3	A calm till 12¼ P. M. a fresh breeze; the N. E. sprung up and continued till after nightfall.
29	5 30 „	11 30 „	12 15 P. M.	1 10	1 5½	10 0 „	3 30 „	3½	1 3	1 10	A slight breeze in the morning from the N. freshened at 11½ A. M. and varying from N. to S. W.
30	5 40 A. M.	1 15 P. M.	1 40 „	1 6	1 2	10 30 „	0 0 „	4	0 0	1 2	The wind has been very unsettled, varying from N. to S. by W. the current did not change as usual from S. to N.
31	5 45 „	3 10 „	3 50 „	1 4	10 0	0 0 „	0 0 „	0	0 0	1 4	The wind as yesterday—The current has continued to run from the S. all day.

Return of the Charges fired in the Pamban Passage during the Month of February 1837.

Date.	No. of holes	Average depth.	Diamr. of holes in in.	Line of least resistance.	Charges of each.	In what contained.	How fired.	
		ft. in.	ins.	ft. in.	lb. oz			
11	2	1 9	6	1 0	1 4	Qt. bottle	With 4 feet each of Bickford's hose.	Both blasts were surcharged, and besides a great many small fragments, four large blocks of stone were detached from the rock : they were fired simultaneously.
	1	1 6	3	1 6	0 8	Pt. do.	do. do.	Blew out the tamping, but split the rock.
	1	1 9	3	1 3	0 10	do. do.	do. do.	Produced a very good effect, and knocked off a large portion of stone into small fragments, fired simultaneously with the eight ounce charge.
	4	1 10	3	1 3	0 10	do. do.	do. do.	These four charges fired simultaneously produced a most excellent effect; there were two nearly out of water: the stone, within the range of these four blasts, was broken into small pieces besides some large blocks that fell into the channel, one stone of 3-lb. weight was projected to a distance of fifty yards. N. B.—Bickford's hose burns at the rate of a yard a minute nearly.
17	3	2 0	6	1 3	1 4	Qt. do.	With 5 of do.	These three went off with very good effect.
	4	1 6	3	1 0	0 10	Pt. do.	With 6 of the Engr. Serjt's. hose.	These four blasts fired, with the Engineer Serjeant's fuse have every one of them failed, but we managed to extract three of the bottles out of the four from the holes in which they were placed, the other was too tightly jammed.
18	11	1 9	3	1 3	0 10	do. do.	With 6 of Bickford's hose.	The effect of these was excellent; the stone in many places was split into small fragments. One failure, and that the only one, proceeded from the fuse being placed in one of the bottles that had been taken out of the holes where they had remained all night; the powder must have been slightly damaged for every particle of the hose down to the tamping had burnt. The small channel is now nearly completed to the desired depth and breadth.
	5	2 0	6	1 6	1 4	do. do.	do. do.	
25	1	2 6	6	1 6	3 0	Leather case	Bickford's hose.	The leather case was made in the shape of a bottle and well dammered over. One quart bottle did not explode in consequence of the fuse not having been fired, one was fired with Serjeant Reardon's hose and went off, one pint bottle was fired with the hose made at Madras and failed as usual. One quart bottle, the leather case and the pint bottle with the same hose, were fired simultaneously then one quart bottle and one pint bottle, and lastly three quart bottles, one proving a failure. The effect was very [illegible]
	5	2 0	6	1 6	1 4	Q. bottle	4 with Bickford's and the other hose made by Serjeant Reardon of the Sappers & Miners.	
	2	2 0	3	0 10	0 10	Pt. do.	With Bickford's & the other with the [illegible]	

Return of the Charges fired in the Pamban Passage from the 1st to the 31st of March 1837.

Date.	Numbers.	Depth of holes.		Diameter of holes.	Line of least resistance.		Charges.		In what contained.	How fired.	
		ft.	in.	in.	ft.	in.	lb.	oz.			
1	4	3	0	5	7	0	2	12	Leather bag	Bickford's hose.	One failed, but the cause not apparent, the hose had burnt to the powder, which was a little damp near the neck, without any visible opening; the others had an admirable effect and detached a large quantity of stone.
2	3	0	0	0	0	0	0	0	do	Bickford's	These charges were not registered, being on detached stones; the effect good.
4	6	2	6	4	7	0	2	8	Tin case	Portfire	Five were fired simultaneously, two failed from a tube being broken by the raft, the other had the portfire blown out by the concussion, the others were reprimed and exploded singly with good effect—the stone in some places heaped up to the surface.
	1	2	6	6	7	0	7	0	do	do	
	7	2	0	3	6	0	1	4	do	do	These were in the small channel, five were fired simultaneously, a method we now abandoned, as only one took effect; the portfires being started by the explosion of the first, they were then reprimed and fired in succession; the portfire of one went off on being lighted.
6	12	2	6	4	6	0	3	0	Leather case	Fuse sent from Madras	The fuse was divided into lengths of ten feet, but all went out, with the exception of one which exploded after 22 minutes: the oil covering the surface of the fuse appears to have penetrated to the powder which will not answer even out of water.
7	7	3	0	6	7	0	7	0	Tin case	do	Employed the fuse as a substitute for portfire; two cases failed from some powder being in the tube which burst them without firing the charges.

Return of the Charges fired in the Pamban Passage from the 1st to the 31st of March 1837.

Date.	Numbers.	Depth of holes.		Diameter of holes.	Line of least resistance.		Charges.		In what contained.	How fired.	
		ft.	in.	in.	ft.	in.	lb.	oz.			
8	2	6	0	6	7	0	7	0	Tin case	Quick match	One case failed, being broken by the boatmen in pulling down; all the other exploded with good effect.
	3	3	0	3	7	0	2	8	do	do	
	1	3	0	3	7	0	3	0	Leather case	do	The leather case had been nearly cut through in tamping—water penetrated the powder.
9	3	3	0	6	7	0	7	0	Tin cases	do	One tin case failed, from the joint having been imperfectly soldered, one leather case from too much resin having been put into the dammer; the remainder had a very good effect.
	4	3	0	3	7	0	2	8	do	do	
	3	3	0	3	7	0	2	8	do	do	
10	3	3	0	6	7	0	7	0	do	Pipes & quick match	All the charges were fired separately, but the failures were greater than usual from the quick match having been injured, and the tube not perfectly light—the effect on the whole good.
	5	3	0	3	7	0	2	8	do		
	4	3	0	3	7	0	4	1	Leather cases	do	
11	3	2	6	3	7	0	2	8	Tin cases	do	All exploded with very good effect, but the 6-lb. charges were rather too great for the stones, which were broken into small pieces, occasioning greater trouble in removing.
	5	2	9	5	7	0	6	0	Leather cases	do	
13	4	2	6	6	7	0	6	0	Leather cases	do	The whole of the charges answered, though several required being primed again from the quick match going out—ultimately all were fired. The leather bags answered admirably, from giving to the uneven surface of the stones.
	5	2	6	4	6	0	4	8	do	do	
	3	2	6	6	7	0	7	0	Tin cases	do	
	1	2	6	3	6	0	2	8	do	do	
14	1	2	6	3	3	0	4	0	Leather case	do	All succeeded, and great masses of stone were thrown up high above water.
	2	2	0	6	5	0	7	8	do	do	
	4	2	6	6	5	0	7	0	Tin case	do	
	6	2	6	3	4	0	2	8	do	do	

	4	2	6	6	6	0	7	0	do	do	tance of one hundred yards.
	5	2	6	6	6	6	6	3½	Leather case	do	
16	1	2	6	6	5	0	6	14	do	do	The current was exceedingly strong; one charge only failed, though several had to be relighted several times—a dangerous experiment. The 10-lb. charges had less apparent effect than the 7-lb. and may be accounted for as having a greater depth of water.
	1	2	6	6	7	0	10	0	do	do	
	3	2	6	6	6	0	7	0	do	do	
	1	2	6	3	5	0	2	8	do	do	
17	1	2	6	6	7	0	10	0	Tin case	do	Eleven charges were fired with the hose and quick match, the remainder with hose and small pieces of portfire attached to the end, which fell down the tube when lighted. This answered when the tubes were perfect, but if it met with any obstruction, the air sometimes blew it out. The charges were all ultimately fired and the effect good.
	4	2	6	6	7	0	7	0	do	do	
	11	2	6	3	5	0	2	8	do	do	
	3	2	6	3	5	6	2	14	Leather case	do	
	3	2	6	6	6	0	4	10⅓	do	do	
	2	2	6	6	7	0	7	5	do	do	
20	4	2	6	6	7	0	6	11	do	do	Two failures occurred to-day, from being obliged to use old tin tubes saved from the former explosions; some of the portfires were blown out by the air being suddenly exhausted by the heat of the portfires. On the whole the effect was good and no powder lost, having recovered the two cases, the powder dry though many hours under water.
	9	2	6	3	6	0	2	8	Tin case	do	
	2	2	6	6	7	0	7	0	Leather case	do	
21	2	2	6	6	7	0	10	0	do	do	One 10-lb. charge failed from the rapidity of the current which broke the tube, all the rest were exploded to the south of the reef.
	8	2	6	3	5	0	2	8	Tin case	do	
	5	2	6	6	6	0	4	6½	do	do	
22	2	2	6	6	7	0	10	0	Leather case	do	Employed quick match with a weight leading down to the powder, and two strings, one to light the other if it goes out.
	4	2	6	6	6	0	4	5½	Tin case	do	
23	4	2	6	6	7	0	10	0	do	do	
	4	2	6	3	5	0	2	8	do	do	Water perfectly transparent, could see the least stone at the bottom; found we were on a bed or field of levelled rock of a hundred feet in breadth; the charge of 10-lb. blew the tamping, and rose a column of water about thirty feet high, recharged with the same quantity of powder the holes still remained. The same having increased in depth about one foot, very little effect produced by the explosions; ordered the holes to be made five feet.
	1	2	6	6	5	0	5	2	Leather case	do	

Return of the Charges fired in the Pamban Passage from the 1st to the 31st of March 1837.

Date.	Numbers.	Depth of holes.		Diameter of holes.	Line of least resistance.		Charges.		In what contained.	How fired.	
		ft.	in.	in.	ft.	in.	lb.	oz.			
25	9	2	6	6	7	0	5	$11\frac{4}{9}$	Leather case	Pipes and quick match	These charges fired off the bed of rock, and with tolerable success; all exploded and much stone broken. Three heavy charges fired which made craters but no fracture in the field of rock; fired two small charges round these holes which enlarged them sufficiently for work.
	4	3	6	6	7	0	10	0	Tin case		
	4	3	6	3	7	0	2	8	do	do	
29	2	2	9	3	6	0	2	8	Tin case	do	Every ounce of powder had its proper effect; large stones were hurled to some distance in the air, but the stone is of a compact quality.
	7	2	9	6	6	6	6	$2\frac{4}{7}$	Leather case	do	
30	3	2	9	3	6	0	2	8	Tin case	do	Commenced blasting at 11 A. M. on the southern reef; the effect was excellent—we finished at 3 P. M. The jumper and borer were very unfortunate in their work to-day. In the morning the raft had been placed on a sand bottom, and only one hole was completed; in the afternoon the current was too strong for the divers.
	8	2	9	6	6	0	5	$6\frac{1}{3}$	Leather case	do	

Date.	Number.	Depth of holes.		Diameter of holes.	Line of least resistance.		Charges of each.		In what contained.	How fired.	
		ft.	in.	in.	ft.	in.	lb.	oz.			
1	5	2	9	3	6	0	2	8	Tin cases.	With quick & slow match.	The effect was remarkably good; the first six were fired on the southern reef and the two others ninety yards to the south of the northern reef.
	3	2	9	6	6	0	4	10⅔	Leather case.	do	
3	1	3	0	6	7	0	10	0	Tin case.	Quick & slow match.	Four blasts were fired a little south of the northern reef—nothing but compact sand—the intervals between the holes were, however, completely blown away, the other five were fired opposite to No. 8 buoy; ninety yards north of northern reef; the effect was good, the stone having but slight adherence, split into numberless fragments, but the intervals between the holes were completely blown away.
	3	3	0	6	6	6	5	0	do	do	
	5	3	0	6	6	6	5	13⅘	Leather case.	do	
5	2	2	9	3	6	0	2	8	Tin case.	do	Three blasts took place opposite No. 2 buoy 270 yards north of the northern reef, the next three were a little to the north of No. 4, the next one was opposite No. 5, and broke the other two holes by the explosion, and the next four were between No. 8 and 9; the effect altogether was very good, the bed of the channel was ploughed up in those places where the blasts took place. The intervals between the holes were entirely blown away, and some stones of a quarter of a ton in weight were displaced.
	7	2	9	6	6	6	5	0	do	do	
	2	2	9	6	6	6	10	0	do	do	
7	2	2	10	3	6	0	2	8	do	do	The stone was split into small fragments there were very fine size, but the lined intervals were blown away.
	7	2	10	6	6	0	5	0	do	do	
	5	2	10	6	6	0	5	5	Leather case.	do	
8	1	2	10	6	8	6	10	0	Tin case.	do	Three blasts were fired eighty yards south of the north reef; the effect most excellent, three or four stones of two tons in weight were thrown considerably above the surface of the water. The other six, fired on the southern reef, removed a great quantity of stone.
	1	2	10	3	6	6	2	0	Leather case.	do	
	7	2	10	6	6	6	6	10⅐	do	do	

Return of the Charges fired in the Pamban Passage from the 1st to the 15th of April 1837.

Date.	Number.	Depth of holes.		Diameter of holes.	Line of least resistance.		Charges of each.		In what contained.	How fired.	
		ft.	in.	in.	ft.	in.	lb.	oz.			
10	7	2	10	3	7	0	2	8	Tin case.	Quick & slow match.	The effect was good, although the stone was broken into small fragments; one case failed to-day from the quick match bursting the tube at a part where it had not been soldered.
	6	2	10	6	7	0	6	$4\frac{2}{3}$	Leather case	do	
11	1	2	10	3	6	6	2	8	Tin case.	do	Four charges were fired a little to the south of the southern reef, the effect was very good, and large blocks of compact sandstone were detached from the bed, the other nine blasts were fired on the northern reef, the stone being considerably soft.
	12	2	10	6	6	6	6	0	Leather case.	do	
12	6	2	11	6	7	6	5	$2\frac{2}{3}$	do.	do	Two blasts were fired 100 yards to the north of the northern reef, the rest 140 yards N of N reef. The effect produced was very good; the holes are now made considerably deeper than they used to be, and I do not think it exaggeration to assert that after a certain depth the effect increases in a greater ratio than the cubes of the same depths.
13	4	2	10	6	7	6	5	14	do.	do	Four charges only were fired off to-day about 50 yards south of the north reef. The effect was good but the stone was broken into small fragments.
14	1	2	11	3	7	6	2	8	Tin case.	do	Five blasts were fired 120 yards north of the north reef, and the effect was very good; some stones of pretty large dimensions were detached. The rest were fired 150 yards north of the north reef; two had an excellent effect, and the other three blew the stones into large fragments.
	9	2	11	6	7	6	5	$4\frac{4}{9}$	Leather case.	do	
15	10	3	0	6	9	6	5	$13\frac{2}{5}$	do.	do	One blast was fired 40 yards N. of N. reef another 120 yards N. of N. reef, and the rest 180 yards N. of N. reef, they all went off and produced very good effect, with the exception of one, the tube of which burst.

I.—*Remarks on the use of Captain Kater's Altitude and Azimuth Instrument.* — *By Lieutenant* J. Campbell, *Assistant Surveyor General.*

In the 20th volume of Jamieson's Edinburgh new Philosophical ournal, Mr. Galbraith has given a paper upon the powers and use of ater's circle, which appears to be the first account of the instrument ublished.

After shewing the degree of accuracy with which astronomical obervations may be made with so small an instrument, Mr. Galbraith emarks: "the deductions from these small but compact instruments re much more accurate, therefore, than from their size we had any eason to expect, and may be advantageously employed in many eodetical and astronomical operations with great success. Hence, the smaller sized ought to recommend themselves to scientific travellers, and to medical officers attached to foreign stations, who are anxious to distinguish themselves in geographical and astronomical researches."

The dimensions of one of these small circles in my possession, made by Robinson, of Devonshire-street, Portland-place, London, are as follows:—

The case is nine inches high and five inches square at the bottom, and, having pieces of brass for the levelling screws let into the top, it serves upon occasion as a stand for the instrument. The circles are three and a half inches in diameter, cut to 30' on a silver arc. The vertical circle has two verniers which read to 1', and the azimuth circle has three verniers which also read to 1'. The level is fixed to the back of the vertical circle. The telescopes are achromatic and magnify seven times, and the one attached to the vertical circle is fitted with two negative eye-pieces, one of which is diagonal, and a dark glass is adapted to each; this telescope has *four* wires, one vertical and three horizontal, which are convenient in taking altitudes, because a mean of three observations may be obtained without touching the instrument.

A stand with three legs, like that of a theodolite, with a plate to receive the adjusting levelling screws, with another to embrace the upper part of the screws to hold the instrument firm, would be a convenient support on some occasions, but a small table, or a bullock trunk, makes a very good stand, when no better is at hand.

The pocket box sextant is the only instrument which can be compared with the circle for portability, and that requires the aid of an artificial horizon, and, consequently, no altitude can be taken with it above 60°—unless the instrument is made with a second index glass at right angles to the first, and has dark glasses fitted to the second eye hole, when it may be used to measure the sun's altitude when in the zenith with the meridional horizon, and in fact becomes a sort of portable zenith sector. Let A (Pl. 4, fig. 2) be the sun's place near the zenith, B the artificial horizon, and C the place of the eye, and the angle measured by the sextant, then will the sun's zenith distance be equal to half the angle A B C or

$$= \tfrac{1}{2} (180 - L\ C)$$

$$\odot' , Z\ D = 90 - \tfrac{1}{2} C.$$

In using the circle, Mr. Galbraith says that Captain Kater has observed the latitude by a *single* observation of the pole star, with only a maximum error of —26″.

No doubt in the hands of so scientific an officer as Captain Kater, the instrument would be made to give more exact results than when used by other persons, but, without attempting to arrive at so much nicety, the instrument from rough observations, such as are likely to be made by travellers, can give results practically very useful, without wasting any more time that would be required with larger instruments.

The following observations for the latitude of Calingapatam were made by reducing the altitude of the sun's lower limb to the meridian by a common watch, the error of which was found by equal altitudes a quarter of an hour before and after the meridian passage.

1st	mean of	12	altitudes.	=	18°	19′	32″	N.
2d	do.	13	do.	=	18	19	34	
3d	do.	8	do.	=	18	19	55	
4th	do.	9	do.	=	18	19	9	
5th	by a watch without a second, wanting for the seconds.							
	Mean of 6 altitudes.			=	18°	20′	17″	

The three latter observations were made very roughly to ascertain the maximum error possible to take place. In these observations all the work was concluded in 30 minutes, including the observations for equal altitudes.

Had a pocket chronometer been used, the results would doubtlessly have been much more exact, for an error of 8″. in the time, gives an error of 1′ in the latitude, if the hour angle is 20 minutes, as may be found by differencing the formula for reduction.

$$= \frac{2}{\sin 1''} \sin^2 \tfrac{1}{2} P.\ \cos.\ \text{dect.}\ \cos.\ \text{lat.}\ \text{cosec}\ Z\ D$$

$$\text{Error} = \sin \tfrac{1}{2} P. \cos. \tfrac{1}{2} P. \frac{\cos.\ \text{lat.}\ \cos\ \text{dec.}}{\sin\ Z.\ D.} . 2\, x''$$ when x'' is the

error of the hour angle in seconds of space.

In surveying extended tracts of country, the circle may also be used with advantage, for, small as it is, from the fineness of its wires and steadiness, it is capable of as much exactness as those lumbering instruments the theodolites, as generally constructed in England for land surveying, beyond which purpose they are fit for nothing. In measuring six horizontal angles round a station, each angle being measured on a different part of the circle, after moving the instrument, the sum was but little less than 360° viz. = 359° 1′ 0″; whence it appears the instrument will measure an horizontal angle with only a maximum error of 10″, a degree of exactness to which no theodolite can generally approach.

From the readiness with which it gives accurate results for the latitude, the circle when used in surveying would make very apparent the error caused by neglecting the difference of latitude between the foot of the perpendicular and the parallel, or by taking the distance from the perpendicular as the difference of latitude, as is sometimes done in rough work. The amount of this error is shewn by the subjoined table computed from the formula.

$$\text{error} = \tfrac{1}{2}\ \pi''^{2} \cdot \text{tang.}\,\lambda.\ \sin 1''$$

when π'' is the perpendicular in seconds of the equator, and λ' the latitude found by turning the distance from the perpendicular into seconds by Lambton's table.

Table of the error always subtractive from λ.

λ	PERPENDICULAR.					
	30′	1° 0′	1° 30′	2° 0′	2° 30″	30° 0′
5°	1″	3″	8″	11″	17″	25″
10	1.4	5	12	22	35	50
15	2	8	19	34	53	76
20	3	11	26	46	71	103
25	4	15	33	59	91	132
30	5	18	41	72	113	163

Now, as the error likely to be committed in using an indiffernt instrument is not likely to be more than thirty feet in sixty miles, the error, as shewn in the table, is too great to be neglected. This error may be more conveniently applied by computing a table in which as a function the error is given of the difference of longitude, by changing the formula.

In the diagram (Pl. 4 fig. 3) let A D be the meridian of the first station, B C the perpendicular of any other station, then A being the pole, D C will be the parallel of latitude of C, and A D will be the co-latitude of E, and not A B, and B D will be the error or the difference of latitude between the foot of perpendicular and the parallel.

$$\text{Take}\quad AB = 90 - \lambda$$
$$BC = \pi$$
$$AC = 90 - (\lambda - x)$$
$$DB = x.$$ then by right angled spherics

we have

$$\sin(\lambda - x) = \sin\lambda \cos\pi$$
$$\sin\lambda.\cos x - \sin x.\cos\lambda =$$

dividing by $\sin\lambda$ we have

$$\cos x - \sin x.\ \cot\lambda = \cos\pi$$

and the $\cos x$ being nearly $= 1$, and substituting the value of $\cos\pi$

$$1 - \sin x.\cot\lambda = 1 - 2\,\overline{\sin}^{2}\tfrac{1}{2}\pi$$
$$\sin x. = 2\,\overline{\sin}^{2}\tfrac{1}{2}\pi\ \text{tang}\,\lambda$$

and taking x'' and π'' for the sines

$x'' = \tfrac{1}{2}\pi''^{2}.\ \text{tang}\,\lambda.\ \sin 1''$ which is the formula before given,—but the angle B A C is the difference of longitude between B and C, and in the right angled triangle A B C

$$\text{Tang}\,A = \text{tang}\,\pi.\ \sec\lambda$$
$$A'' = \pi.\ \sec\lambda$$ and transposing
$$\pi'' = \cos\lambda.\ A''$$
$$= \cos\lambda.\ \text{diff. longitude}$$

substituting this in the last formula

$$x'' = \tfrac{1}{2}\delta''^{2}.\overline{\cos}^{2}\lambda\text{-}\ \text{Tang}\,\lambda.\ \sin 1''$$
$$= \tfrac{1}{2}\delta''^{2}.\cos\lambda.\ \sin\lambda.\ \sin 1''$$

or become $\cos\lambda.\ \sin\lambda = \tfrac{1}{2}\sin 2\lambda$

$x'' = \tfrac{1}{4}\,\delta''^{2}\cdot\sin.\ 2\ \lambda.\ \sin 1''$ from this formula the following table is computed x always subtractive :—

λ	DIFFERENCE OF LONGITUDE.					
	30′	1° 1′	1° 30′	2° 0′	2° 30′	3° 0′
5°	1″	3″	6″	11″	17″	24″
10	1	5	12	21	34	48
15	2	8	18	31	49	70
20	2	10	23	40	63	91
25	3	12	27	48	75	108
30	3	14	31	54	85	122

By using a table of this kind, the error may be corrected without any additional trouble, or wasting time in the niceties of the computation by the formula; if it is ever necessary to undertake a survey of any extent with the small circle, or to use inferior instruments, when others cannot be procured.

In sketching in a hilly country, like those which are common among the mountainous tracts of India, when it is difficult, and sometimes impossible, to ascend to the summit of hills, from the impenetrable jungle which generally clothes the sides, the circle becomes a very useful instrument, from the facility with which azimuths of the sun or moon may be taken with it; by which means an azimuthal triangulation may be carried on, with as much readiness as with a circumferentor, but with infinitely greater exactness.

In using the circle in this way the subjoined diagram will explain the method of operation.

Let A (Pl. 4 fig. 4) be the plan of a camp, from whence the hill stations D and C can be seen. Let B be a little hill from where D and C can also be seen. Let the distance A B be assumed as a base, and the distance guessed by the perambulator. Let the latitude be exactly ascertained at A, and also the angles B A C and B A D be measured from A, and also the angle between B and the sun's centre. Let the angles A B D and A B C be observed from B, then with the base A B the distance D C may be computed. From E, another camp beyond the range of hills D C, let the angle D E C be measured, and also the angle between the sun and one of the stations D or C. Then, if M express the meridian, the angle M E C being known, the angle M C E is also known, from the azimuth at E, and also the angle M C D from the azimuth at A, and, the distance D C being given, the triangle D E C may be computed. Again if F is another camp, separated from F by another range of hills, but from D and C can be seen, D E and C E can be computed in the same manner, and from E and F more points as G &c.

may be laid down, and the survey thus carried on without losing time in climbing hills, and the district may be sketched in while proceeding from camp to camp. After the detail has been completed, another observation for the latitude at the extreme of the survey in latitude, will give the difference of latitude between the last station and A, with an error of not more than 1000 feet at the utmost, and then from comparing the true difference of latitude with the computed difference from the assumed base, the true length of the sides of the triangles and the base may be found, without the trouble of measuring a base, even if a piece of ground to measure it on could be found in such a country.

XII.—*Observations on Professor* Wilson's *Historical Sketch of the Kingdom of Pándya, in the Sixth Number of the Journal of the Royal Asiatic Society.—By the Rev.* Wm. Taylor, *Member of the Madras Literary Society, and Auxiliary Royal Asiatic Society.*

The Editor of the Madras Journal of Literature and Science has been so kind as to refer No. 6 of the Journal of the Royal Asiatic Society to me, with a special indication to articles ix. and xix., affording me the opportunity of adding any remark respecting them. For this polite and gentlemanly mode of proceeding I feel deeply obliged, while I judge it to be expedient to avail myself of the privilege so accorded. It has also yielded me no small measure of satisfaction to find that any imperfect labours of mine attracted the attention of the Boden Professor of Sanscrit at Oxford; and were honoured with any remarks, in the way of discussion, from one so profoundly versed in the ancient classical language and history of the more northern portion of India. In the two volumes of Translations to which his observations refer, I am fully persuaded that there are so many indications of my very respectful esteem for that learned individual as not to need any laboured reiteration in this place: but I may express some regret, that, in cases wherein I somewhat differed from his conclusions, I had not more scrupulously weighed the exact force of every word, not merely as it would bear on the impressions of others, for they would readily perceive the respect which pervaded the writer's mind; but also as it might influence the person whose deductions were immediately concerned. The Professor will, I trust, pardon me any error, or indiscretion, or want of caution, of this kind, if it occurred, as possibly it may have done; and will in rearn receive the assurance that, on this ground, I very readily coincide in he propriety of his laying his hand a little heavily upon me, at the lose of his note, to which in due order I purpose to add some further xplanation.

I would now briefly notice in the same order the topics adverted to by rofessor Wilson. The Madura St'hala Purana, of my Translations, nd the Madura Purana of his documents are the same work. The ' Pandion Chronicle," of my work, a name given by myself for distinction sake, is, to the best of my knowledge and belief, not to be found mong the Mackenzie MSS. any more than the original of the "History f Karnata Governors;" but of this last the translation by Mr. Wheatey indicated No. 23 in the list at the end of article IX, is no doubt from hat original. I have by me a rough translation on country paper of that MS. in Mr. Wheatley's own hand-writing, and, from respect to his nemory, I went so far as to have a fair copy made from it, for the use of the press; until, in the actual comparison of the original and translation, I found the latter too paraphrastic to represent the original on my plan of proceeding, which was to give the original and translation on parallel pages, and to annotate or paraphrase afterwards: a mode of proceeding which I still decidedly prefer; because the errors of an annotator, if he fall into such, can be corrected, but a verbose, or paraphrastic, or indeed any thing except a close and literal, translation, corrupts the springs of knowledge at their source, and introduces error in its most specious, and with difficulty to be distinguished, form. I have the most perfect respect for Mr. Wheatley's talents and fidelity. in saying so—for it was only in the just principles of translation that he erred; nor have I a particle less of entire respect for Professor Wilson in saying, that he has been susceptible of error, and in some instances I think has been mistaken from this source of erroneous deduction.

Adverting to the comparative antiquity or otherwise of "the chronology of Pandyan history," I now very readily state, as the result of more extensive enquiries, since I published the two volumes of translations, that I am prepared to yield considerably in the claims of antiquity which I had assigned to some events in the *Pandya* history: Something must turn on the question, whether the foundation of Madura was antecedent to the visit of Rama of Ayodhya to Ramesuram as the Madura Purana asserts, or whether it was posterior, as Professor Wilson, guided by a translation from one manuscript, had stated. I would however just in this place, leave the matter as Mr. Wilson has left it: remarking only that a single inscription of any grant by *Kuna-Pandiyan* with a distinct date, should we be able to meet with such a thing, would do more towards settling the question than a volume of mere dissertation.

With regard to the particular MS. and that passage of it which now stands forth so prominently, I could wish that the expression quoted by Professor Wilson had been softened. Being cut out from its connexion and printed in italics, it reads harsh, whereas the whole paragraph in the Prefatory Notice to the 2d volume of translations, would I suppose be by all admitted to be deferential in no ordinary degree. Every sentence, or member of a sentence, of any writer may be so used; but it is I believe an axiom among critics, that any expression so excided is not to be taken as indicating the spirit or meaning of the entire context. The point of the question is this, that several authorities traced up the lineage of the most early rulers of Madura, to a particular son of a particular patriarch (so to speak) among the ancestors of the *Hastinapuri* race of kings. The position assumed by Professor Wilson, if accurate, at once nullified the whole of these authorities. The particular passage is (Descriptive Catalogue vol. 1, p. lxxiv.)—" the founder of the (Pandya) kingdom according to the local traditions, was a person named *Pandya*, a native of Oude, and of the agricultural caste." But " the local traditions" as indicated by me (Oriental Historical MSS. vol. 2, Ap., p. 35) did not, to the best of my judgment, direct to such a statement ; all my authorities were against it ; and on tracing the matter minutely in the Descriptive Catalogue, the statement, or rather something like it, was found only in one MS. in the account of which (Descriptive Catalogue vol. 1. p. 188,) it is said, " amongst these (pilgrims) was *Mathura-náyaka Pándya** a man of agricultural tribe from the north of India, who colonized the country along the *Vygi* river and founded the city of Madura." The MS. itself on being examined did not fully bear out this statement ; and that circumstance was mentioned, on its being discovered, in the simplest possible language, in a short note (Oriental Historical MSS. vol. 2. Ap. p. 39), of which Professor Wilson has used only the concluding words. The particular point turned on the word " Oude," and on the word " *Pandiya*," as denoting a man, or person so called, as a proper name, which two things are not borne out by the manuscript, and the importance of the discrimination rested in this fact, that if the position chosen by Professor Wilson was just, then all other authorities were wrong: a matter of some consequence to the discussions in which I was engaged. I may add that in the original of the MS. in question the translation which I gave in the above note, of *Vada désattilulla pándiyanákira vellázhan*, might have been still better and more accurately rendered " an ancient agriculturist in (or of) the north country." As before rendered the specific country "Oude" was set aside, and the term Pandyan made an appellative (as it is truly is) and *not* a *proper name.* I was not then so perfectly conscious that the appellative *pándyan* should be translated "an ancient:" it was the Telugu language in which *pánta* as an adjective for *old* is familiarly common, which first brought the circumstance to my notice. In Tamil that word is now obsolete, though formerly in common use. I must add my conviction that the manuscript in question, as a compilation by a Christian servant of Colonel Mackenzie, has no claims to be regarded as an authority; but as the proof of this position could only arise from a translation of this MS. and also of the *Chola Déva Púrvika Cheritra,* by the same writer, I must rest that position for the present only on my own assertion. I regret that my very innocent use of the word "information" should have been construed into an "assumption—implying it is to be inferred verbal information:" it is properly the inference that is "gratuitous and mistaken," seeing that the assumption was never made. I had attentively read the Introduction to the Descriptive Catalogue, and could not but be aware of the statements contained p. xviii—xxi, quite sufficient to prevent any idea of the author's depending on mere verbal statements. I have yet to learn that the word "information" used in the Prefatory Notice to the 2d vol. O. H. MSS. is limited to *verbal* information; but if the inference were in any measure founded on what appears in vol. 2. p. 63., then I can appeal to that whole paragraph; borne out as it can be shewn to be by the Introduction and Catalogue: and, conscious of inward rectitude, and outward substantial accuracy, would solicit the Professor not to be needlessly annoyed by differences of opinion, which in the fair fields of literature when candidly and openly stated, are never considered to be censurable; but I expressly recall the words "verbal accounts of natives" in p. 63. because, without any allusion to that page, Professor Wilson has contradicted it indirectly, as if implied by the word "information" in the Introduction. That "the translations were the work as frequently of European as of native scholars as specified in the list attached to the sketch," is, most candidly speaking, not borne out by that list, wherein out of twenty-eight documents, the names of only one European translator is given, that is to say the name of R. Clarke, Esq. I readily add Mr. Wheatley as a second (though a slight inaccuracy is involved); for the rest either no names, or the names of natives, strictly such, appear. Now I trust the Professor will consider me not uncandid, when I make no comment on this discrepancy; but I must further add that in the Introduction to the Des: Cat: p. xxi, it is stated—"with a very few exceptions the translations are the work of natives alone." I bow with extreme deference to the name and authority of R. Clarke, Esq. who was here one of the best Tamil scholars of his day; but in the first place it is perfectly well known that European gentlemen of Mr. Clarke's rank do not servilely labour at translations themselves, the rough work always being done for them by natives; in the second place I am sure, arguing *à priori* from the above reason and *á posteriori*, from the false translation ascribed to him, that Mr. Clarke did not write that passage, while his eye rested on the original paper, and his hand traced the alleged rendering by him—it would be a libel on that gentleman to say so; though it is none to presume that, in the general way, he may have passed and authenticated the translation by his signature, without reference to critical niceties; in the third place, I pledge myself that the exact words of the original manuscript represented in Roman characters, are given above, and not all the learning, ingenuity, and talent, even of Mr. Clarke could render them fairly in any other way than I have done. For these three reasons, to adduce the mere authority of a "*magnum et venerabile nomen*," as set off against a false translation, or to confirm a conclusion based on an erroneous one, is in my view irrelevant to the question.

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* Being translated, " the Madura lord Pandya."—W. T.

If, quitting this particular instance, there were any person's translations that I would admit, it would be those of Mr. Wheatley, whose office and profession was that of a translator, not solely *de nomine* but *de fide*; yet his principle of accommodating to the ideas of Europeans, and paraphrastic rendering, comports not with my principles of translation; nor with, abstractedly speaking, correct principles of translation: if so without knowing any thing of Mr. Clarke's labours, what opinion could I antecedently have formed of native translations for Col. Mackenzie, of a portion of which in the Professor's own words, "the "value* is much diminished by the very imperfect manner in which "they have been executed, the English being frequently as unintelligi-"ble as the original: with a very few exceptions, the translations are "the work of natives alone."

I am bound to give the Professor considerable praise for the tact with which he handles an advantage given to him by a passing expression concerning the Supplementary Manuscript, which it is added, "we consider as trustworthy." But this expression is cut out from the context, as noticed before in a similar case, and so obtruded, by no means gives the sense of the entire connection in which that expression is found. It occurs, vol. 2 p. 75 while at p. 72, the particular discrepancy quoted by the Professor is discussed; the fictions (universal among *Hindus*) as to the long reign of *Vicramaditya* are also sifted, and reduced to something like order in various parts of the work: in p. 73 it is said "Vicramaditya ruled in reality about a hundred years," a large allowance by the way. The statements of the supplementary MS. were by no means implicitly taken; dates in MSS. are sometimes faulty from transcription, but a translator cannot alter them; and finally though a prevailingly favorable opinion is given of the Supplementary Manuscript, yet a doubt at p. 76 plainly appears, whether its testimony can be maintained, and at p. 77, the "submitting the evidence of manuscripts implicitly to the test" of the author's "own discretion," is expressly declined, and judgment left with the readers. Professor Wilson is quite right in exercising his judgment and discretion; and only unfair in his mode of treating the translator and commentator. That five names will not do for the record of 3000 years is certainly true; such a position of the Supplementary Manuscript was not intended to be designated as "trustworthy:" it was expressly noted unfavourably; but the Professor certainly knows that all *Hindu* accounts of Vicramaditya are extravagant; and the simple truth probably is, that, under the guise of a miraculously long reign, they wish to cover over a period disastrous to *Hindu* ascendancy, and derogatory to their country's glory. Accurate records of that period must be sought for elsewhere, and not from among the *Hindus.*

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* Des; Cat: Intro: p. xxi.

Being fully disposed to admit and believe that among the manuscripts of the Mackenzie collection there are many valuable documents, more so certainly than the Supplementary Manuscript, I shall hope to see the whole brought into full development. Abstracts, however they may serve to give a general idea, will not suffice in critical, or doubtful cases: either the original, or else a faithful, literal, and critical, translation becomes then indispensible. On this plan it would give me pleasure to be able to consider my previous humble researches with chiefly my own materials, as a sort of vestibule to the Mackenzie temple; or, if the idea may be better, as a porter's lodge to the park and mansion of a peer of the realm.

Adverting to the "Historical Sketch of the kingdom of *Pandya*" (Art. 9, No. 6, J. R. A. S.) it is not without great hesitation that I make any remarks; as far as personal considerations are concerned, I certainly would avoid doing so; but there is some tone of dictation and confidence in the Professor's manner; his name and authority confer of themselves a sanction of his statements; and hence a few comments may prevent mistakes in others, and ultimately subserve an important public object which I purpose to announce in the sequel. These considerations, chastened by the most entire respect for the high attainments of the Professor in Sanscrit literature, will guide my observations.

It is not strictly accurate to restrict the meaning of the term *Dravira désam* to " the extreme southern portion of the east-part of the peninsula," a definition which is besides so loose that it must in strictness exclude the *Chola desa* and *Chera desa* which it professes to include, and shut out all, but the *Pandya-desa*, which alone and by itself answers to the definition. The *Dravida-désa* would answer to our familiar use of the term Peninsula as regards extent. The common division, in reference to languages, which is made by intelligent natives into the *Panja-gauda*, and *Panja-dravida*, gives to the latter a measure co-extensive with the more classical term *Dacshin*, or the south. I am acquainted with one native authority which limits the term *Dravida* to the country wherein the Tamil language is spoken, fixing the northern boundary at *Tripeti*. Extreme minuteness of remark is not in this particular of consequence. A little further on the Professor has the following statement. " An adventurer named Pan-
" diya of the *Velálar*, or agricultural tribe, first established himself in
" that portion of the south to which his name was afterwards assigned."
To this sentence is appended a note which gives the native *Hindu* statement, heretofore followed by me, by adducing the *Hari vansa* and *Agni Purana* as affording another, and as I conjecture better, account than the above; but rejecting their authority, as far as I can perceive, for no other reason than the silence of the *Vishnu Purana*, or an omission in its genealogy. But it is an established axiom in sound criticism that an omission is not a contradiction. The statement which the Professor has thought fit to prefer to the native accounts has been before sifted, and disproved. It may be as well, notwithstanding, where to introduce a faithful translation of the context in which the discussed, and disputed, passage occurs; which is the following:

"That same *Rama* the king of *Ayodhya* making himself responsible, that the lying-legend *(Poyyána-purana)* which he had made concerning this place called *Ramésuram* was the true way to go to (attain to) heavenly bliss (*Mòcsham*) and having disseminated it widely in the north country, and in other countries, the people of all countries with great intensity of thought (zeal, or enthusiasm) went on this pilgrimage.

" In this manner an ancient agriculturist *(Pándiyánákira vellázan)* of the north-country having set out on this *Ramesvara* pilgrimage came (thither). While coming, having seen this southern *Danda-aranya*-plain (wilderness of *Dandaca*) and this (*Pandya ?*) wilderness plain, with the goodness of soil of this land, and the great rivers in this wilderness, and reflecting on the (degree of) fertility of soil in his own kingdom in the north, and the (degree of) fertility in the soil of this untilled land, perceiving further the goodness of this (latter) he arrived, and having bathed at this *Chethu* (isthmus, or bridge) of *Ramésuram*, completing his pilgrimage, and having paid personal homage to *Paradésa-rishi*, he proceeded, and arrived at his town in the north."

It is then added that he assembled his whole family (or tribe of dependents) and proceeding with them colonized the extreme south, *again establishing Ramésuram*, and then going westward, cleared the woody-ground on the banks of the *Vaigai* river, built a town with its complement of fanes or shrines, and appointed the rule of cultivation, by which a small revenue at first would be gradually increased from year to year, by receiving a larger proportion of the produce. There is, however, throughout no mention of this person's proper name, nor any specification of the particular country or "kingdom" whence he came.

Now, I should not suppose that this statement would be considered sufficient to set aside such authorities as the *Hari vansa* and *Agni Purana*, with that of other manuscripts given by me in the translations more than once referred to. The account is simply that of a native Tanjore Christian, ignorant of just rules of criticism, and exceeding the bounds prescribed to him by his religion, which would allow him to despise the superstitions of the heathen, but not haughtily to reject the evidence of documents, claiming to be historical, and to substitute his own possibly veracious legend in their place. With the assistance of the *Chola-desa purvika Cheritra* written by the same individual, the broadest proof can at any needed time be adduced of his unfitness, through religious prejudice, to discharge the office of an impartial historian, even though it should be of faults, follies, or errors. Of course, I do not think his Christianity concerned in the matter; for the same want of candour or rectitude that I should blame in a Porphyry or a Voltaire, I should blame in a native Christian, if I saw it taking a converse direction in its bearing on native annals; be their subject what it may. Unhappily, as I think, Professor Wilson reposed too much confidence in the dashing, free-thinking, statements of this native, as is very visible in the catalogue. A somewhat fictitious importance has devolved on the passage of the native author's book which has been in question; but remembering that Professor Wilson, while justly insisting that he found in the translation ostensibly by Mr. Clarke, traces of this interpretation, has given up any thing beyond that, I will close this discussion by stating my own full concurrence in his admission, in these words—"that Pandya of Oude," or "a northern Pandion;" had any personal part in the settlement of the country is equally improbable.* Nevertheless the fact would have been received as undoubted, on the authority of Professor Wilson, had no counter-evidence appeared.

The next point which I consider it of any importance to notice, is the identifying *Kurk'hi* with the Kolkhi of the Periplus; and both, following D'Anville, with *Kilkhar* or *Kilakarai*, a sea-port on the Coromandel coast. In the first part of the identification I am disposed to concur; in the latter part of it to differ. Notwithstanding the many cautions given by so many scholars on the subject of etymological deductions, they are not abandoned; yet they are not safe, without a knowledge of the vernacular language to which they refer. I have not No. 5 J. R. A. S. to refer to; and therefore can here only observe that *kilkarai*, simply means the east-shore; and is written கீழக்கரை, whereas கொற்கை *Gorrkai*, the native name of Madura in early times, has no other meaning, that I am aware of, and is radically a different word. In such a point however both D'Anville and Wilson might easily mistake by etymology. I should hesitate to hint even at any analogy between the name of old of Madura, and the distant Goorkhas of Nipal, had I not recently traced a resemblance between the Tamil alphabet and that of Thibet, as exhibited in some specimens from M. Csoma de Coros, given in the Bengal Asiatic Journal; and there may be added to this resemblance the fact that *Agastya* the acknowledged "father of the Tamil language" (that is, as I presume of its *written* language), was, according to tradition, a native of Thibet. Of course this resemblance must not be made the basis of any premature conclusion.

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* Supplementary Note to Hist. Sketch, para. 4.

Any supposed discrepancy between the *Pandya Rajakal*, and the *Tiruvilliyádal*, on the spelling of the word *Chédi* in the former, with the *Setu-raya* of the latter may be easily obviated, without any necessity of adverting to central Hindustan. The Tamil language has properly no sibilant *s*—its own character corresponds with the first palatal letter in Sanscrit that is *ch*, and it is rather a modern erroneous refinement which tends to give the sound of *s*, rather than *ch*, to such words as சேது, which I have myself represented it is true by *Séthu*: but which would be correctly given by *Chethu*. Add that the த, which corresponds with the first Sanscrit dental letter *ta*, is by various persons written in English characters either *t* or *d*; the *u* final is very short, and if a person were to write by ear, he might write *Chedi* just as probably as *Séthu*: if a Telugu man, he would, I think certainly do so. Hence, the two authorities in the original characters I presume to be perfectly harmonious; and the difficulties to be experienced by a compiler from crude translations may receive some passing elucidation. In my copy of the *Pandya-rajakal*, accurately taken from one so labelled in the Mackenzie collection, I do not find the particular fact referred to recorded; but I am apprehensive that this is not the document referred to by the Professor; a supposition which I prefer to blaming the translation made use of by him.

The daily aerial visit of the Chola prince to the shrine of Sundarésvara, is not recorded in my copy of the Madura Purana. It has in it marvels enough; but the aspect which it gives to the *one* visit of the Chola-chief, is rather construable into a well wrought piece of contrivance on the part of the Brahmans, and the *nodus* thought worthy of the god to untie, is the restoration of the seal on the temple-gate, which had been broken during the night. Copies may vary; and at best perhaps the tale is merely a gibe at "the shameless sect" of the hated *Samunar*.

I hesitate as to allowing no existing work to *Narkiren* the famous chief of the Madura College, at least on the reason alleged. The MS. on palm-leaves (Des. Cat. vol. 1, No. xxiii) entitled *Alakeswara-katha*, may at once be set aside on the ground assigned by Mr. Kindersley, but among the MSS. on paper there is one in a book,* No. 7, sec. 2, entitled *Alakesa raja Cadha*, apparently the one intended by Mr. K. to which however his remark in reference to difficulty will not apply, for in portions of it, there are verses in it dark as the Sphinx's riddle, and expressly so intended to be. Popular tradition ascribes this work to Narkiren, as a *jeu d'esprit;* but my own reason for doubting his authorship arises from the part which the poetess *Avvaiyar*, is made to take in it. A just deduction will I think place *Avvaiyar* much later than *Narkiren*; and a haughty *Brahman* who *(sic dicitur)* would not concede the palm to *Siva* himself, was not the person to do honour to a *Paria*-poetess.

With regard to *Agastya*, I believe, that many of the works imputed to him are not genuine; but I think so much is due to uniform tradition as to concede that an individual so named, first gave to the Tamil people a written alphabet, and some outlines of grammar, and this too at a very early period; though his labours were ultimately eclipsed and set aside, as regards grammar, by the *Tolcapiam* and *Nannul.*

The opinion given by Professor Wilson in the catalogue as to the existence of *Bauddhas* and *Jainas* at Madura, re-appears in the sketch, though very considerably modified. The translation by the Honorable G. Turnour, Esq. of the *Mahawanso* a *Pali* work, having since confirmed the conjectures thrown out by me in the two vols. O. H. MSS. as to the original identity of those two sects, I should not advert to the subject, were it not to state that I do not see, how for a moment the work of *Tiruvalluvar*, could even in conjecture be thought to have subserved the introduction of the *Jain* or *Bauddha* faith into Madura. *Hindús* look upon his book as quite orthodox. I may note that the word *Kadal*, if not a misprint, must be traceable to very careless translation. That word in Tamil means *the sea* (being synonimous with *Samudra* in Sanscrit) whereas *Cural* is the title of the poem, denoting a particular species of Tamil versification.

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* I have not succeeded in tracing out this book in the Des. Cat: the document Sec. 2 Art. xxiii. p. xlii. App. vol. 2, seems to be only a duplicate copy of the other tale, and the contents do not accord with those of the five sections in book No. 7.

During the interval between writing this note, and correcting the press, I have found the tale mentioned in the Catalogue, under the title of Tamul Perumal Cheritra—*By* Seyallar.

I shall add no further observation as to the more modern portion of the sketch except it be to remark that, throughout in the subordinate running notice of the *Setu pati* and the *Maravas*, there seems to me to be some confusion or repetition; some anachronisms and errors: for example, the *Setu pati*, was at no time independent of the Nayak dynasty of Madura; but was merely the chief feudatory. So much however at different times has been written by me regarding that principality that I need not add more.

To me the most striking portion of the whole sketch, is a note attached to para. 7. The account in that *para.* of *Malaya Dhwaja* might have been enlarged; but at present I have to do with the note. It is therein said that " the traditions of the south make him a more important character, and consider him as the father of Chitraganda the wife of Arjuna." The visit of Arjuna to Madura and his marriage there with the king's daughter is very fully recorded in my copy of the Tamil *Bàratham*, an abstract or prose-version of the *Mahabharata*; but whether to be borne out, or not, by the collated Sanscrit work, I cannot tell. However, there is not the slightest mention made of *Malaya Dhwaja*. The only question with me is, how did the Professor come at " the traditions of the South." Not by personal intercourse it need not be said, neither by manuscript authority, for that is not tradition, nor yet from Col. Mackenzie's assistants, for such of them as were at Calcutta were Telugu Brahmans, who never went very far south of Madras, and besides Professor Wilson has somewhat indignantly rejected the idea of trusting to verbal information from them. I know not where else to look for the traditions except in the first vol. of Or. H. MSS. where the conjecture is thrown out, and occasionally again and again referred to, as merely my own conjecture, arising from a notion produced, as I was going on with my work, that possibly the entire origin of the whole superstitious fable, in which a marriage is so conspicuous, might turn on the asserted visit of Arjuna to Madura. I certainly never heard it from any one, nor copied it from any book; and in the face of considerable difficulties I still think it plausible if not probable. Had not the Professor carefully barred out the idea of his having made any use of my assistance in his sketch, I should have thought that he had done so, my first volume of translations having reached England at the close of 1835. A doubt arose on the subject in various places, while reading that sketch; but especially in reference to this particular note. However, I may mistake; and will not be positive.

There are some matters of less moment in different parts of the sketch, which might be commented on; but I forbear.

It is now due to the learned and indefatigable Professor to state that he has made a better sketch of the History of Madura of the olden time, than I should antecedently have thought to be practicable from his acknowledged materials. The general accuracy—in so far as native documents can be admitted to be authentic—predominates over the occasionally doubtful or erroneous portions; and that there are a few errors in it tends not to reflect by any means on the Professor's labours, but to elucidate a point of some public moment which I announced my intention to develope. This is, that if there be any person in Europe who could educe, and set forth in order, the contents of the Mackenzie MSS., Professor Wilson is that man. I do not think any one could vie with him; yet since even his account of the plainest and best authenticated portion of Peninsular history is defective, owing to the materials wrought upon, then no person in Europe I conceive is qualified properly to give an adequate or fair representation of the contents of that collection. The full investigation of them in this country is perhaps the more important from the possibility of being made answerable for documents never contained therein. I have seen a production and a very clever one too, which, lauded by the *Atlas* as just the thing they would wish to see generally done in reference to the Mackenzie MSS., and transferred to the pages of the Madras Journal of Literature and Science, is yet, I will venture to say, essentially non-oriental, though quite western, in character; and, with possibly some foundation in the Colonel's own Survey-papers in the Mackenzie collection, is yet for the greater part possibly the result of the able writer's own ingenuity and personal observation.

Should Professor Wilson follow out his expressed purpose of giving accounts, in the Journal of the Royal Asiatic Society, of the other Peninsular dynasties, before any thing of the kind may proceed from myself, there is no one else who would offer them a more cordial welcome, or read them with greater interest and pleasure. I should rejoice to receive hints or corrections from such a source. However, I retain my impression, long since announced, that the field is not ripe for the harvest of the general historian; or for discussion and condensation. All original authorities, worth any thing at all, should in my opinion be printed in parallel pages, with faithful and literal translations. Annotations may be added; but inferences or conclusions, in a general or final way, ought not to be drawn until the whole evidence is fairly and fully given. Then the judge and recorder may come, sum up, abstract, decide, and ordain; but, as it seems to me, not at an earlier period.

ADDENDUM.

Subsequently to my having sent in to the Editor of this Journal the foregoing observations, I incidentally met with the number for January last of the *Asiatic Journal*, on the library table of the Madras Literary Society. It contains a brief critique on the second volume of Oriental Historical Manuscripts, little more than an echo of some statements of Professor Wilson, and in a tone of so much subserviency to him, that I might be at liberty to pass it by without remark, especially as I had written the foregoing, without knowing anything of an article seemingly composed with so studied an effort towards the depreciation of my imperfect production, which I should be the last to consider free from faults. But, since the writer of that critique expressly indicates an opinion that I had borrowed from the pages of the *Asiatic Journal*, it may perhaps be as well simply to deny the implication. Adverting to the Carnataca Chronicle the writer says—"the whole of the 'History' was given in this Journal ten years back, and we cannot help remarking that the co-incidence of expression in the two translations is so striking, that we are almost justified in asserting that Mr. Taylor must have had this version before him at the time when he executed his own. If not, we can only say it is one of the most miraculous instances of correspondence between independent translations of oriental works ever known or heard of."

I regret that I have not the volume of the *Asiatic Journal* referred to by the writer at hand, to compare with my translation, but, however miraculous the correspondence alleged to exist between the two productions may have appeared to him to be, one thing is certain, which is, that I had not the slightest knowledge whatsoever of the existence of such a paper until I met with this statement of alleged co-incidence, and implied plagiary. I think, however, that I am able to solve the enigma without having recourse to a miracle. In the preceding observations, towards the beginning, I have mentioned my having a rough paraphrastic translation by Mr. Wheatley of the Carnataca Chronicle, which I had intended to make use of. My intention, had it been fully carried out, was to have given him the merit of the translation, and to have added a brief sketch of his life and labors. In pursuance of that intention, I compared the translation and original; and, as both were to appear on parallel pages, I found Mr. Wheatley's mode of translation would not do. I then attempted to render his translation more literal by various alterations; a mode of proceeding which proved to be more tedious, and less satisfactory, than simple translation, to which I then resorted on my own principles. A page or two, however, of his translation, with my alterations, I sent to the press, and the first section of the Carnataca dynasty, possibly a portion of the second section, gives the result of my attempt to act upon my first plan, which, to my regret, I was compelled to lay aside, and with it my proposed notice of Mr. Wheatley himself. Those who know the relationship in which I am placed towards that late excellent man, will readily comprehend why I wished to pay him a public token of respect, as well as understand my regret on finding that it could not be handsomely done. Now it is evident that the translation, which I then supposed had not passed out of his hands,* must have been copied out fair, and supplied to Colonel Mackenzie, seeing that the translation by Mr. Wheatley is enumerated by Professor Wilson as among his authorities. It follows also that very probably this same translation was printed in the pages of the *Asiatic Journal.* If such a supposition be true, it will also follow that the alleged miraculous correspondence, could not be so perfectly complete as is implied, nor could any co-incidence extend over the second section, except as to the facts recorded, which, in both translations, would be the same. I am not therefore uncandid when I infer, that the critic's comparison did not extend over the second section at the utmost; and that he was not very particular in his inspection is manifest from his singular caricature and omissions, as to the appendix to the second volume, which he professes nevertheless to define; as well as from the circumstance of quoting a passage as if from the Tamil, which in reality was a translation from Telugu. Indeed it may have been an object with him to deny to me any thing beyond " a familiarity with the Tamil language;" and, if so, to effect it he has taken a liberty with the passage, in quoting it, utterly unpardonable. The translation from the Telugu is (vol. 2 p. 205)—" In those days the Padshah (customarily) sent to all countries, &c." The critic's professed quotation says—" The Tamil author states that the Padshah (Mogul) in those days was accustomed to send, &c." Begging his pardon, the Padshah referred to was not the Mogul, and the words " the Tamil author" are quite gratuitous, and unwarrantable. Had he looked at the top of p. 190, he would have seen the translation expressly stated to be from the Telugu language. Further, when a critic says, " one of the anecdotes, &c. may be worth citing," it would of course be supposed that what follows in smaller type is a quotation: it is however no such thing. On reading it over at the Literary Society's rooms the thought arose—" are these my words "?—and comparison has proved them not to be so, but the critic's own abstract of what I wrote, and in abstracting he has made me amenable for language which I did not use, and which is anything but a translation of the original authority. To expose such glaring disingenuousness I should consider quite sufficient for the criticism. I must, however, regret the critic's attempt to make it appear as if I sought a comparison with Professor Wilson, who in " Sanscrit literature," in "general learning," and "critical knowledge," I readily recognize to be my superior: if I claim any equality, it is in the moral attributes of truth and simplicity. When, moreover, in pursuance of his comparison by contrast, the critic says—"the one is an historian the other a translator"—Ireadily acknowledge this also; and, after so many indications as I had given, in the two volumes of Translations, of my opinion that in Hindu history we want literal Translations as the basis of future deductions, I wonder that he should have thought that I assumed the office myself of historian. Perhaps Professor Wilson has not assumed so much: if he has done so, the future historian, really such, will probably cut down his sketch to smaller dimensions.

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* See Oriental Historical MSS. Vol, I, Preface p, xvii.

I have, however, now done with the critic; and avail myself of the occasion offered me to translate, and thereby quote, a few pertinent remarks of Mons. M. A. Langlois in the Introduction to his French Translation of the *Hari Vansa*, published in 1834, by the Royal Asiatic Society. Mons. Langlois says—"It has seemed to me that the opinions of those who had occupied themselves with the ancient history of India, had always wanted a basis, and that, in being called to be their judges without having under our eyes the vouchers of the process, which they alone had consulted, we were obliged to yield an implicit credence to their assertions, often shaken by the contradictions themselves of their various systems. I have wished that it were possible to furnish criticism with the proofs of which it has need, so as to give to India that history, the existence of which, up to the present time, is doubted. I have not been able to believe that this people, which have existed so long, and occupy so vast a surface on the globe, who hold so distinguished a place alike in past and present times, could continue disinherited of their ancient annals: I have thought it to be needful to go and seek for these in India's own books, where they will be found often mingled with fables of every kind; and that, in translating these writings, it would be well to deliver over to criticism, frankly, and without any attachment to a system, the materials which ought to serve in this work of re-construction."*

These sentiments are the same, in other words, as those, more than once, asserted in my two volumes of translations; and since repeatedly maintained by me, both in the columns of this Journal, and elsewhere; without knowledge of M. Langlois's views, which have only very recently come to my acquaintance. Perhaps with a pardonable complacency he places himself at the head of those who shall follow after him in this plan of proceeding. I conceive, however, that the credit of the plan rests with the Royal Asiatic Society. They, as far as I know, first laid down the principle as to literal translations. Their idea struck me as just, and I followed in my imperfect measure. M.

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* Introduction—*para* 2.

anglois has done so; only omitting the needful point of printing the ext in parallel pages. I may add that the Honorable G. Turnour, hom I ought to place perhaps first, has followed the same system in is translation of the *Mahawanso*, and, allowing for others unknown to ne, we have two scholars, and myself—a humble third labourer—acting on one plan, as nearly as possibly at one time, and in three ery distant places on the globe. And we, with those that may oin with us, shall ultimately prevail. When I most respectfully add the Committee of Papers of the Bengal Asiatic Society, nd, as I believe, I may do, the Committee of Papers of the Madras Literary Society, to those who approve of this plan of proceeding, I o not mean to place them last and least, but to shew that there is as strong a re-inforcement as perhaps can be offered or expected. Premature historians will not stand the test of the results; and sycophant critics will not impede them.

As regards the difficulties of translation in Europe, concerning which I have more than once offered an opinion, the experience of M. Langlois may also be adduced, though those difficulties are less as regards Sanscrit possibly than any other language of India. M. Langlois says,—" I am myself first to feel all the imperfection of my work, which has been performed from a text deduced from three manuscripts, not very correct; of which two, the one Bengali, and the other Devanagari, belong to the Royal Library at Paris, and the third given by Mr. Tod to the Asiatic Society of London, was obligingly communicated to me. But no one of them had a commentary; of which I but too often found the need. Phrases singularly concise, allusions incomprehensible, words unknown, have often stopped me; and I ought not to flatter myself that I have always avoided the danger of shipwreck which they presented to me. I may have made mistakes; but I venture to hope that the learned, who alone will perceive them, will be most ready to pardon me, appreciating, with a kindly feeling, all the difficulties which I had to overcome."[*] As an example of those difficulties, M. Langlois meets with the word, *Vasous (Vasus)*, and in a note he asks " what are the " *Vasus*? I avow that in this point, I can only form conjectures." I do not quote the example invidiously, far from it: for M. Langlois has done his difficult work, generally speaking, well; but such are the difficulties to which scholars in Europe are liable. The text along with the translation, in parallel columns, would have, been desirable: and when India's own native works, fabulous, mythological, allegorical, poetical, and the like—always denying the epithet historical—shall have been, on that plan, duly and fully developed, either I greatly err, or India will cease to want a history.

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[*] Introduction p. xv.

XIII.—*Horary Meteorological Observations made at the Equinoxes and Solstices, agreeably with the suggestion of Sir* John Herschel.

1*st.*—*At the Madras Observatory.*—By T. G. Taylor, Esq. *H. E. I. C. Astronomer.*

1837	Time.	Baro-meter.	Ther.	Direction of wind.	Strength of wind.	Weather.
June		inches	°			
21	6 A. M.	29.854	86.3	——	Calm	Cloudy—drizzling rain.
	7 "	.880	81.6	——	do	do do
	8 "	.900	80.1	N. W.	Very gentle	do do thunder.
	9 "	.920	79.7	do	do	do do do
	10 "	.920	79.0	do	do	Cloudy.
	11 "	.912	82.6	W.	do	do
	12 "	.900	84.0	W.	do	do
	1 P. M.	.883	83.8	N. W.	do	do
	2 "	.860	85.0	do	do	do
	3 "	.880	85.2	do	do	do
	4 "	.845	85.0	S.	do	do
	5 "	.845	85.0	E. S. E.	do	do
	6 "	.852	84.8	do	do	do
	7 "	.872	84.2	—	Calm	do lightning to the W.
	8 "	.900	84.2	S. E.	Very gentle	Clear do
	9 "	.902	84.3	do	do	do do
	10 "	.920	83.5	do	do	Haze do
	11 "	.918	82.8	do	do	Cloudy do
	12 "	.892	82.4	do	do	do do
22	1 A. M.	.854	82.0	S.	do	Haze.
	2 "	.850	81.0	S. E.	Calm	Clear.
	3 "	.864	80.5	—	do	Flying clouds.
	4 "	.866	80.4	—	do	do do
	5 "	.876	81.8	S. W.	Very gentle	Haze.
	6 "	.886	81.7	do	do	Clear.
	7 "	.904	81.9	do	do	do
	8 "	.922	83.2	do	do	do
	9 "	.930	84.4	S. S. W.	do	do
	10 "	.932	86.3	W. N. W.	do	do
	11 "	.930	88.2	W.	do	do
	12 "	.922	88.2	S. E.	Gentle breeze	Flying clouds.
	1 P. M.	.910	88.4	S.	Moderate do	do do
	2 "	.900	87.8	S. E.	Strong do	Clear.
	3 "	.850	87.5	do	do	do
	4 "	.846	87.0	do	do	do
	5 "	.850	86.0	do	do	do
	6 "	.848	86.0	S. S. E.	do	do

2d.—At Hoonsoor, in Mysore.—By Wm. Gilchrist, *Esq. of the Madras Medical Establishment.*

Day.	Hour.	Dry thermometer Fah.	Wet thermometer.	Barometer.	Winds.	Clouds, &c.	Remarks.
June 21	6 A.M.	68.25	66.75	27.416—	S. W. merely perceptible.	Overcast.	Rain yesterday afternoon, thunder and lightning this morning—ground wet—feels raw and damp.
	7	68.9	67.5	.422—	do rather stronger.	Overcast with low nimbi moving N. E.	
	8	72.25	69.5	.448—	do light breeze.	Overcast—N. E. quarter dense cum-strati—S. W. quarter clearer.	
	9	74.5	70.75	.464—	do do do	Do. some low cumuli in various parts of the hemisphere.	
	10	75.5	70.75	.482—	do do do rather stronger than at 9.	do. low dense cumulo-strati, and nimbi in N. and in E. quarters, moving N. E.	
	11	77.9	71.25	.484—	do as at 10.	Low, dense cumuli and cum-strati, edges ragged, over hemisphere.	
	12	79	71	.464—	do occasional airs.	Overcast—cumuli over hemisphere, but smaller and less dark	
	1 P.M.	80.5	71.25	.45—	do light breeze	Large, dense dark cumuli and cum-strati over hemisphere.	Sun obscured—no shadow.
	2	76.5	70.5	.434—	W. by N. breeze.	Nimbi.	Do.do. rain commenced quarter to 2—has been raining in the vicinity last hour.
	3	75.5	71	.414—	W. by S. do	Overcast—dense cumuli and cum-strati.	Rains N. E. and E. quarters.
	4	77	70	.412—	S. W. do	do cum-strati around horizon.	
	5	74.5	68	.412—	S. W. do	do do do do do	
	6	72	67	.410—	do. do	do do do do do	
	7	71.75	67	.442—	do light breeze	do strati near horizon.	
	8	71.1	67.25	.434—	do do do	do a belt of cloud extending from S. W. to N. E.	Lightning to the eastward.
	9	70.5	67.25	.444—	do do do	Overcast—stars faintly seen.	
	10	70.5	67.75	.464—	do do do	do do do	
	11	70	67	.464—	do airs	do banks of whitish cloud in various quarters.	
	12	69.25	67.25	.45—	do breeze	do do do do do	
22	1 A.M.	70	67.5	.452—	do do	do low ragged edged cumuli moving N. E.	
	2	70	67.5	.430—	do light breeze	Nimbi, scud, moving N. E.	Drizzle.
	3	70	67.25	.434—	do do do	do do do do	do.
	4	69.5	67.25	.430—	do do do	do do do do	do.
	5	69	67	.416—	do breeze	do do do do	do.

Day.	Hour.	Dry thermometer Fah.	Wet thermometer.	Barometer.	Winds.	Clouds, &c.	Remarks.
22	6	69	67	.434—	S. W. light breeze……	Overcast.	
	7	71.5	69	.436—	do airs	do. low, ragged edged cumuli moving N. E. In northern quarter an extensive bank of nimbi	
	8	72.5	69.5	.456—	do light breeze ……	Overcast, low, ragged edged cumuli moving N. E.	
	9	75.25	69.25	.480—	do do do………	do dense cumuli and cum-strati.	
	10	76	69.2	. 49—	do do do………	do do do do	
	11	77.5	70	. 49—	do breeze.	Overcast, except in S. E. quarter. Dense cum-strati near horizon. Nimbi S. W. quarter.	
	12	78.6	69.9	.486—	do do	All round horizon cumuli and cum-strati—zenith overcast—clear on part midway between zenith and horizon.	
	1 P. M.	80.9	70.25	.482—	do rather strong breeze.	In upper regions thin ragged cirri and strati, both stationary, lower regions cumuli, moving N. E. ……	Between the upper and lower stratum of clouds there appears to be electrical action—the latter frequently become ragged at edges and send off portions—subsequently become rounded.
	2	81.1	70.1	.470—	do do do do …	Overcast with dense cumuli and cum-strati. ……	Shadow on horizontal plane 3.214 inches, perpendicular being 6 inches long.
	3	79.5	70·5	.460—	do do do do …	do large dense cumuli and nimbi moving north-east, upper stratum of cloud stationary. … …	Rain to the northward.
	4	75	70	.456—	do strong breeze……	Nimbi. ……	Rain last half hour.
	5	73	69	.444—	do do ………	Nearly overcast, low clouds moving rapidly N. E.	
	6	72.4	69	.452—	do strong breeze …	Small nearly detached cumuli over hemisphere in upper regions—low thin scud moving rapidly N. E.	

Total quantity of rain during observations 0.191 inch, determined by weighing. The thermometers used were placed under a thatched verandah uninfluenced by radiation or reflection. The barometer at a window immediately adjoining having a northern aspect—the thermometers are correct—the barometer is .042 too high—the heights given are as read off without any correction.

The shadow was determined by an apparatus consisting of a rod of iron pointed at top, and rising perpendicularly to the height of six inches, exactly above the plane of a piece of wood 2¼ feet long by 2 inches broad. At each corner of the wood a screw is placed by way of foot: by which is effected the adjustment of the upper surface of the wood to the true horizontal as indicated by two levels attached to it at right angles to each other. In order to see distinctly the shadow, a piece of white paper was pasted on the upper surface of the wood, with every care to preserve a level surface. The termination of the shadow was pricked off at the respective time of observation, and the length between the mark and the semi-diameter of the wire was measured with the detached scale of a barometer vernier, which read off to 1-500th of an inch.

Hoonsoor is W. 15° south of Seringapatam, distant 28¼ miles, and is W. 50 N. of Mysore, distant 26 miles.

3d.—*At the Trevandrum Observatory.—By* J. Caldecott, Esq.

Date.	Hour.	Bar. corrected for tempr. 32.	Thermr.	Depress. of W. B. therm.	Dew point.	Direction of wind.	Velocity of do	Clouds, aspect of the sky and remarks.	Solar radtn.*
			°	°	°				
June 21	6 A. M.	29.845	75.0	1.8	72.39	W N W	1.	Cum. and fl. cl. threatening from W.	—
	7	.855	75.3	1.7	72.85	N by W	3.	Overcast.	0.5
	8	.873	76.0	1.0	74.57	N W	1.	do.	0.75
	9	.878	77.2	1.7	74.82	W by N	1.	do.	—
	10	.893	77.9	4.2	71.9	N W by W ¼ W	2.	Heavy cum. and fl. cl. threatening.	1.9
	11	.887	79.3	2.1	76.4	N W by W	1.	do. do. do.	5.75
	Noon	.878	81.5	3.8	76.25	do	1.	do. whole sky obscured threatening —squall of wind and rain from W. at 12*h*. 10*m*.	—
	1 P. M.	.881	79.2	2.8	75.31	N W	1.	Rather clear—flying clouds.	5.4
	2	.853	80.8	4.5	74.5	do	0.5	Overcast with heavy cum. rain at 2*h*. 30*m*—light wind N. W.	.95
	3	.839	77.0	3.0	72.73	W N W	1.	Overcast—cum.	Observations prevented by clouds and rain.
	4	.835	77.5	2.5	74.	N W	1.	do. do.	
	5	.838	77.2	3.0	73.	N W	1.	do. do. raining.	
	6	.843	76.4	2.6	72.65	N W by W	1.	do. do.	
	7	.864	75.7	2.2	72.54	do	1.	do. flying clouds about zenith.	
	8	.884	75.7	1.7	73.26	do	1.	do. do. do.	
	9	.899	75.5	1.5	73.37	do	1.	do. do. raining.	
	10	.909	75.4	1.4	73.4	do	1.	do. do. do.	
	11	.905	75.0	1.0	73.55	do	1.	do. do. do.	
	Midn	.895	75.0	1.0	73.55	do	1.	do. do. do.	
22	1 A. M.	.873	75.1	1.4	73.0	N by W	1.	Overcast.	
	2	.848	74.2	0.8	73.0	N	3.	Light cum. in zen. heavy at the hor.	
	3	.842	72.6	0.0	72.6	do	4.	do. pleasant breeze.	
	4	.849	72.6	0.1	72.5	do	4.	do. do.	
	5	.853	73.5	0.5	72.77	do	3.	Overcast, do. drizzling.	
	6	.870	74.0	1.4	72.0	W S W	4.	Heavily overcast and raining.	
	7	.885	73.5	1.0	73.0	W S W ¼ W	2.	do. do.	
	8	.906	73.7	0.7	72.69	do	2.	do. do.	
	9	.920	74.5	0.9	73.22	do	2.	do. do.	
	10	.943	75.7	1.2	74.0	W S W ½ W	2.	Fl.cl. in zen—cum. about the horizon.	
	11	.942	76.0	1.5	73.9	N W by W	1.	do. do. drizzling.	
	Noon	.931	75.0	1.5	72.84	W N W	2.	do. do. raining.	
	1 P. M.	.921	74.0	1.3	72.1	N W by W	2.	do. do. do.	
	2	.903	75.7	1.3	73.85	N W	1.	do. rather clearer.	1.95
	3	.898	76.5	2.2	73.37	do	1.	Overcast.	0.5
	4	.891	77.2	2.7	73.3	N W by W	3.	do.	0.5
	5	.893	76.4	2.9	72.23	N W	3.	do. raining.	—
	6	.895	75.7	1.7	73.26	do	1.	do. drizzling.	—

*Note.—These two days were unusually obscured—the actinometer on the four preceding days indicated *at noon*—7,75—12,6—12,25 and 2,25 respectively.

June 21st.—Fall of rain from	6 A. M. to 6 P. M.	.201
„ 22d.—do.	6 P. M. to 6 A. M.	.8835
do.	6 A. M. to 6 P. M.	.5893
	Total in the 36 hours	1.6738 inches.

No thunder nor lightning.

EXPLANATION.

The barometer is the same as was used in the Trevandrum Observations on the 21st and 22d March; in the account of those observations it is mentioned that it appeared to be an instrument worthy of confidence, from a comparison of it made with a fine syphon barometer by Robinson :—it may be as well however to explain that this opinion was formed from the regularity of their differences only; that comparison not establishing the zero-point of Wrench's instrument—the other by Robinson not having been compared with any standard. The latter, however, being one of the syphon kind, may be considered free from most sources of error to which the other is liable, except those arising from the sp. gr. of the mercury, and any error in graduation, and those are not likely to exist in an instrument carefully made by so first-rate an artist. This comparison showed a difference of .007: Wrench's being in excess of the other by that quantity, before any allowance was made for capillarity—with the addition of .075 on this account, the difference was .082. This difference was not attended to in the March observations, nor in these; the observations being left as they are, for a future certain decision of the true zero-point. The correction for temperature is made as before and the same constant .075 is added for capillarity.

The thermometer is the same standard one by Troughton as was used in March, the moistened thermometer is also by the same maker, but indicating 1° higher previous to applying water to the bulb; this has been allowed for in the column of depressions. The dew points are calculated from Professor Apjohn's formula $f'' = f' - \frac{d}{87} \times \frac{p}{30}$ disregarding the correction $\left(\frac{p}{30}\right)$ for pressure—which in this case is insensible.

The direction of the wind is shewn by an anemoscope, and the numbers in the eighth column express by estimation its velocity in miles per hour.

The solar radiation—or the direct heating power of the sun's rays—is measured by a Herschel's actinometer (an account of which is published in the third report of the British Association) and, as affording an interesting comparison of the intensity of the solar rays at the four opposite seasons of the year in this climate, the observations with this instrument will be continued.

The time is the true mean time of the Trevandrum Observatory, in latitude 8° 30′ 35″ north, and longitude 5*h.* 7′ 59″ east.

The elevation of the situation in which the March observations were made was by mistake in copying, stated to be about 50 feet instead of about 150 feet above the sea—the true elevation at which they were made has since been found to be 138¼ feet. The instruments are now placed in a building erected expressly for the purpose, in which the radiation and reflection of heat, and every other disturbing cause, are carefully guarded against. It was in this building that the present observations were made, and the cistern of the barometer is ascertained by actual levelling to be 177¾ feet above the level of the sea (distant in a direct line about two miles). The heights of the mercurial column given in the register are therefore those due to this elevation, corrected for temperature and the bore of the tube, but liable to a future correction (of some small amount) on account of the zero-point.

XIV.—NOTICES OF BOOKS.

Transactions of the Agricultural and Horticultural Society of India. Vol. 3d.—Printed at the Serampore Press, 1837—pp. 320, 8vo.

(Second Notice).

At the conclusion of our last notice of this work, we promised to examine the commercial section in this number, and consider, somewhat in detail, the numerous papers connected with the cultivation of Cotton and Tobacco, as objects, in a commercial point of view, of primary importance.

The papers in the volume, more or less exclusively devoted to the consideration of these two plants, amount in all to twenty-one. Of these twelve make no reference to tobacco; five none to cotton, and four refer to both. We shall first consider

Cotton.—The first paper is a letter transmitting a bag of "Vine cotton seeds," said to be a very superior description of cotton, but of rather too long a staple! which from tending to weaken the fibre, lessens in some degree its value. The seeds were sent to Gowhatty in Assam, and to Mirzapore. It is to be hoped, should this first supply succeed, that we shall soon have an opportunity of trying it in Madras from seeds of Indian produce.

The next two papers on cotton, are letters from Colonels Colvin and Skinner, communicating the results of experiments for the introduction into the upper provinces of Upland Georgia cotton; the exertions of both of whom seemed to promise a very favourable result, but the matter was still doubtful at the period of writing. It seems strange on this side of India, in the inland districts of which the Bourbon cotton plant almost every where thrives, that it has not been more generally introduced in the upper provinces of Bengal. Here it is found a hardier and more productive variety than the Upland Georgian, and the produce higher priced in the English market by some pence, than the Georgian raised on the same lands, or in varying soils in the same tract of country. The fourth notice is a letter intimating the dispatch of a case of Peruvian cotton seed from Liverpool. The cotton is said to be very fine, referable to the long staple class of cottons, and worth about one shilling the pound at the time of dispatch; none of that kind, we believe, has yet reached Madras.

At Allahabad trials of Sea Island had failed, apparently from the seed being bad, but, in the neighbourhood, some Pernambuco seed had been sown and was most thriving. Transplanting had been tried to some extent, and most successfully. That species, the *Gossypium acuminatum* of Roxburgh, bears transplanting well—some which we have in our garden has been twice transplanted without the slightest injury. We consider that a very desirable species to introduce extensively into cultivation, as being a large and vigorous plant, and a free grower, which may be subjected to almost any treatment, except perhaps too rich and moist a soil. In its culture, free pruning seems quite indispensable to the production of large crops, and we believe it may be annually cut down to the roots, though the better plan appears to be, merely to shorten all the larger lateral branches, as well as the leading stem, during the hot season, after the crop has been gathered, which will always ensure an abundant supply of fruit bearing branches without over crowding the ground.

The next paper on cotton is by Mr. Bell, but, being of a controversial nature, we shall for the present pass it, and return to the subject when we have glanced at the remaining papers on the cultivation of cotton.

Part of the Peruvian cotton seed, before mentioned, was sent to Mr. McLeod of Seonee, along with some Egyptian; both vegetated to a greater or less extent, but, owing to the very wet unfavourable season, a failure was anticipated in both cases, but, as both were expected to produce some seed, it was hoped future trials would prove more successful.

This paper is immediately followed by an interesting one on the culture of cotton in Bundlekund. It consists of a series of questions by Mr. Hodgkinson, and replies by Mr. Bruce. From it we learn there are five kinds of soil, the best of which is the *maura*, or black marl, the rent of which varies from one rupee thirteen annas, to two rupees eight annas, per beegah of 18,225 square feet—that some of the best *maura* lands will produce as high as nine maunds of seed cotton per beegah, one-third of which is cotton and two-thirds seed, but the average for that kind of land is only half that quantity—that the average cost per beegah of four different soils, including rent, several ploughings and seed, is rupees 3-13-2¼, producing upwards of a maund of cotton, which, if well cleaned, and of fair staple, would at any time realize twelve rupees per maund. The concluding paragraph we quote entire, as showing the injurious effects of high assessment.

" When I first came into Bundlekhund, I was in the habit of making advances annually to the ryots for cotton, in the months of July and August, generally at eight rupees per maund, upon the security of the zemindars of their villages. As long as the government assessment was moderate, and the landed proprietors in easy circumstances, the system was profitable and answered remarkably well. This cotton seldom cost me more than ten rupees a maund, including balance and establishment. The contracts being for the first produce of the fields, it secured me cotton of a most superior quality at a cheap rate. I was obliged, however, to abandon the system altogether when the government assessment was raised. As the zemindars and ryots became impoverished, so the risk of balances increased, and rendered the speculation precarious. As long as landed property remained valuable, the security of the zemindars was considered safe, but they are so poor now, that advances made upon such security would be hazardous."

This is followed by two short communications on Egyptian cotton by Messrs. Gibson and Bell. The experiments of Mr. Gibson for its introduction had in a great measure failed, from the extreme wetness of the season, but, at the time of writing, the experiment could not by any means be considered as brought to a close, so that no conclusion can yet be deduced from it. The same may be said of Mr. Bell's remarks, except in so far as they show what liberties in the way of transplanting may be taken with it, some plants having twice undergone the ordeal, the last time when full grown and covered with pods, apparently without inflicting the slightest injury, but rather with benefit, as Mr. Bell says, " I remark that all the pods which have been latest in coming to maturity are the largest and best." He concludes by giving it as his opinion, that, if attended to, Egyptian cotton will not only flourish, but yield abundant returns throughout India, and recommends its being tried on an extensive scale.

Captain Jenkins, writing from Gowhatty in Upper Assam, thinks that the Egyptian cotton has failed there, though the plants have grown well, as none of the pods had then ripened. This may prove a premature conclusion.

We cannot help remarking the number of instances of half finished experiments recorded in these transactions, a system we cannot approve of, as such records can lead to no useful conclusions.

We mentioned *en passant* that one paper from the pen of Mr. Bell was of a controversial nature, and that we would return to it; we now do so, considering the subject one of such magnitude, both in its commercial and agricultural bearings, as to merit even a much more comprehensive examination than we can now bestow on it. Mr. Bell's paper is entitled, " Remarks on Dr. Lush's memoir on the cultivation and preparation of cotton in the districts under the Bombay presidency." As we are no parties to the controversy, and as we believe many of our readers are ignorant of its merits, or even of its existence, we shall, in the first instance, present an abridged view of the arguments on both sides, and then make our own comments, beginning with Dr. Lush's paper, which comes first in order.

It opens with an enumeration of the species, botanically speaking, of the genus *Gossypium*. He, following, but going beyond Dr. F. Buchanan Hamilton, reduces the whole series to two, doubtfully three. Hamilton has three, one of which he reduces. Mr. Lush's two species may be distinguished, the first, by having the seeds in each cell of the capsule distinct; the second, by their being combined, and more or less strongly adherent, into a single conical shaped body: neither the ever-varying forms, duration, nor native country of the plant, nor the colour of the cotton, or absence, or presence, of fur on the seeds,* have any weight with him in forming specific differences. The free or combined seeds is his only character; at least such we infer to be his meaning for he does not state it very clearly: hence all our native, or, so called, country cottons, and the long list of introduced nankeen and American sorts, are considered only so many varieties of a single species. The inference from which, at least as we understand him, is, that—as all these varieties are apt, under change of circumstances, to undergo a change of character, and pass from one variety into another, or into new ones, more or less valuable, according as the alteration of soil, climate and culture, has been more or less suited to draw forth the best energies of the plant—it is fruitless labour to try to introduce these foreign varieties into India: for, unless we can provide them with a nearly identical soil and climate, which it is assumed we cannot do, they will speedily revert to the forms now in cultivation, or even deteriorate below that standard, though cultivated with the care and cost of an expensive exotic: and, lastly, that to bestow such pains on an exotic would be worse than useless, because our formerly much despised Indian staple, as it is, daily rises in estimation, and is in such demand for the China and English market, that the quantity exported has risen from eighty or ninety lakhs to three crore of rupees annually, and that now, Surats greatly inferior to those which in 1829 were quoted at 3½ are valued at from 6*d.* to 7*d.* per pound, and the superior sorts, though badly cleaned, fetch a price fully equal to that of Upland Georgia of 1829, owing to the rise of price having suggested new modes of separating the impurities at home, and has rendered a dirty short fibred cotton not so bad an article: therefore, since 5*d.* a pound will give the merchant and grower an ample profit, and while there is so little difference between the price of a dirty and clean cotton, why take the trouble to attempt to alter this comparative ratio, or why need we fear competition with America, since we know we can stand up against a great reduction of price below the present rates. The great object, therefore, is the extensive production of that variety of cotton in common use, as clean and as carefully prepared as may be consistent with cheapness; that an expensive article may be a fallacious improvement, and that an inferior article, if saleable at all, may be more profitable than a confessedly good one: and, such being the case with our short fibred inferior annual cheap cotton, it must still continue the great staple of India, since the supply of American long staples, must always be sufficient to meet the demands of the market, the proofs in support of these positions are adduced in subsequent papers, and, being superior to ours, will always have the preference.

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* M. Jacquemont writes him on this subject, 'I am very sceptical about *Gossypii* species, such as *G. Barbadense*, *G. Arborium*, *G. Vitifolium*, and I do not see any thing in your *G. Cuspidatum* calculated to shake my scepticism. I would swear to *two*, but not even to *three*.'

"However, I confess my scepticism was not confirmed, until I saw further the results of cultivation of American cotton in an experimental farm, and the conversion of green-seeded American into black-seeded cotton like Bourbon."

We believe we shall not be accused of partiality in presenting the above as a fair, or rather indeed favourable, exposition of Dr. Lush's views, as stated in the two first parts of his memoir published in the *Bombay Courier* of the 11th and 15th October, all that Mr. Bell appears to have seen when he wrote his remarks.

Mr. Bell, in his reply, leaves the determination of the botanical question to be dealt with by botanists, but thinks "when Dr. Lush comes forward confidently before the public with a new theory, to which he is anxious all should subscribe, it is time to enquire upon what sort of foundation his hobby is built, and whether practical men will be satisfied with the soundness of his doctrines, when placed in juxta-position with practical proofs."

Alluding to a statement of the Editor of the *Bombay Courier*, that for thirty years fruitless attempts have been making to introduce the foreign varieties of cotton, he observes that it would have been more satisfactory, had Dr. Lush inquired into the causes of these failures, and given them to the public as a preface to his essay, in lieu of a vague theory "wilder, in his humble estimation, than the anticipation of the wildest enthusiasts," as he would then have laid the public under an obligation—that an extension of the principle would equally apply to the non-introduction of other foreign plants, as the Otaheitan sugar-cane, which has been successfully and advantageously introduced—that, whatever weight Dr. Lush's opinions may carry in Bombay, he hopes no one in Bengal will be scared from his good intentions in endeavouring to introduce superior productions, until better proofs are adduced by the publication of the sources of failure. Why does not Dr. L. state on what experimental farm he observed the conversion of green-seeded American, into a black-seeded smooth cotton, and his authority for assuming that black-seeded cotton was in reality from green-seeded American? If there was so much attention paid to the transformation of seed, why was there not equal attention paid to staple?—practical men paying little attention to seed, provided the cotton does not degenerate ; and it by no means follows, that change in the external appearance of the seed is accompanied by depreciation of the quality of the produce :—finally, he rejects Dr. Lush's theory as chimerical, " because he has advanced nothing whatever to convince him, that it is easier to improve indigenous, than it is to establish, permanently and profitably, the superior staples of foreign countries." Dr. L., having mentioned the different qualities of some samples of cotton produced on different kinds of soil, namely, pure black, black sand, and black with nodules of lime gravel, the last infinitely the worst, he assumes, because the result is at variance with those deduced by Mr. Piddington from experiments, that he had not looked beyond the surface, otherwise he would have found a more formidable enemy to the improvement of indigenous and successful introduction of foreign cotton than soil, in the poverty of the cultivators (without however inferring that soil is not a powerful agent), and in their mixing other crops to make the soil yield its utmost ; and quotes some instances in illustration from papers in the Transactions. He then goes on to observe that " the foregoing remarks sufficiently account for 'the mixture of dirt and leaves, and the shortness of staple', complained of in the dispatch of the Honorable Court of Directors to the Bombay Government in 1829, alluded to in Dr. Lush's essay, and is laid hold of to establish another important error which the Doctor, in his zeal to make converts to his views, has the indiscretion to publish, viz. 'The fact is, that the rise of price has suggested new modes of separating the impurities at home, and the dirty short fibred cotton now turns out to be not so bad an article.' "

To this it is answered, that, had the author digged deeper, and asked the cause of this extraordinary rise of price, " the answer would have been, extraordinary demand—and whence the demand ? The answer would have come home to Dr. Lush, and all who are concerned in the prosperity of Indian agriculture. The skill of the English has ruined our Indian looms, and thrown some millions out of bread. The expensive machinery of the English must be kept going, and if they cannot get good cotton to work up to clothe those whom they have deprived of the means of earning a bare subsistence, why they must take bad, and as they are obliged to take what they can get, it is better that we should plant cotton than starve, and as we cannot afford to buy good cloth, the English will consult our means, and be keeping their wheels in motion, and men at work, by sending us cheap bad cloth." Hence the inference that though bad cotton, rather than none, it does not follow that if better cotton were introduced we should not find a remunerating market, and that, in proportion to the means of purchasing, would be the quality of the manufactured article.

The practical results adduced to prove that foreign cottons, superior o the country ones, can be produced in India, and the probabilities of heir becoming extensively cultivated in the Bengal provinces, we do not think it necessary to recapitulate; for, however satisfactory so far as they go, they are yet comparatively in their infancy, and on too small a scale to admit of any thing beyond prospective conclusions being deduced from them, and can only be looked upon as experiments n progress, but not sufficiently advanced to afford sure data from which o reason, and therefore not fit to be opposed to the experience of Dr. Lush, as given in his succeeding papers.

Mr. Bell concludes his paper with the following comment on Dr. Lush's statement, that the cotton imported (from the interior?) into Bombay, has increased within a few years from the annual value of ighty or ninety lakhs to nearly three crores—" I am at a loss to know rom what source Dr. Lush has derived his information, but if the *Bombay Courier* of the 10th May 1836, gives correct views of the cotton rade, the exports of this article for six years ending 1835 inclusive, to China and Great Britain, afford an average 195,118 bales, and, supposng them to contain 300-lbs. each, and estimating the cotton at eight rupees per maund, would give an annual export of something more than fifty-three and a half lakhs in value. How the dealer disposes of the difference, say two crores, I am at a loss to understand. The exernal commerce of Bengal has not, for many years, been so brisk as it is at this moment, but Bombay will beat us hollow if she takes such fast strides with other products as Dr. Lush has given her credit for in the article cotton."

The extracts we have made from this paper are sufficient to show the style of the author, and the preceding abstract the train of argument he employs. We acknowledge the difficulty of abridging Mr. Bell's writing, but the space we have devoted to his paper, will, we trust, satisfy him, if we have failed in doing him justice, that it is from no want of inclination on our part. To this paper Dr. Lush has published a reply, a portion of which we shall quote, partly with a view of exhibiting a specimen of his style, on which we propose by and by to make some observations, but still more to show how he has evaded the strongest argument brought against him, and which, if inconclusive, ought to have been the easiest answered; thereby leaving the impression on the mind that Mr. Bell has equally the advantage throughout.

" I have received Mr. Bell's paper, which is instructive and amusing; of course most of the remarks are answered in those portions of my paper which have been published since he began his commentaries."

" It is rather desultory work replying to remarks on a paper, when you are uncertain how much of it has been read, but still very certain that part, that has been read, has not been understood—however, I cannot but feel flattered at the notice taken of my remarks, and hope it will appear not the least satisfactory point having frightened Mr. Bell. I must take the liberty of beginning at the end of Mr. Bell's paper, and proceeding upward; by this method we discover the source of Mr. Bell's alarm, namely, the great and increasing prosperity of Bombay. Mr. Bell may be assured that I have very good authority for estimating the trade in cotton at very nearly three crores. He says 'the external commerce of Bengal has not for many years been so brisk as at this moment, but Bombay will beat us hollow *(hinc illæ lachrymæ!)* if she takes such vast strides, &c. &c.'"

Here we put it to our readers, to Dr. Lush himself, now that the irritation under which he penned that passage has subsided, to say whether he would be satisfied with such an answer from another, or if that is meeting the question fairly. The accuracy of a statement of his, presumed to rest on official returns, is called in question, on the faith of the correctness of official authorities, open to all, which seems incontestably to prove that his statement is a greatly exaggerated one; and how is the objection met? not by producing his authority, but by telling his readers that Mr. Bell may be assured his statement rests on good authority! This may be satisfactory to him, but not to us; the more so, when we find that, at the rate of sixty-two and a half rupees per candy of 500-lbs., it amounts to the enormous quantity of 240 millions of pounds; or more, by a million, than the estimated produce of the whole of India, and more than half (nearly six-ninths) the produce of the United States.

We trust Dr. Lush will not accuse us of envying the prosperity of Bombay, for we can assure him that none can more heartily rejoice in her success than we shall, when he makes good his assertion, by the production of adequate authority; but, until he does so, we must be excused for withholding our belief in its accuracy, and adding that we think he has weakened all the other statements adduced in reply to Mr. Bell's objections, by shirking the only one which, if his authority be such as he alleges, could have been answered to the satisfaction of all parties, by their immediate production. Having thus far followed Dr. Lush in beginning with the end of Mr. Bell's paper, partly we confess, with a view to show how much he has lost the vantage ground on which Mr. Bell's premature attack placed him, by descending from the elevated tone of scientific discussion to the dogmatizing one of his antagonist; a departure from decorum which can only be excused by allowing for the feeling of injustice done him, under which the reply is dictated; we shall now return to the beginning, and notice a few only of the leading points of difference between them.

After a careful perusal of the whole series of Dr. Lush's papers, it appears to us that their sole object is to prove that labour and care

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efore, we think, a most dangerous argument to urge, that, be-
se Indian cottons at 5*d.* per pound will give an ample profit to the growers, therefore we have no reason to fear "what some please to term competition with America," for even a moderate check to consumption, with an overstocked market, produces a depression out of all proportion to the check; so that a few millions pounds extra of American cotton, thrown suddenly on the English market, might be productive of the greatest loss and inconvenience to the Indian growers and merchants, how much more so if the supply could be rendered permanently equal to the demand. The way to prevent such accidents is to raise, by care and attention in their culture, our Indian staples to an equality in all respects with the American. That such may, nay, that such will, be produced, we feel quite certain, if not in Bombay, the soil and climate of which seems peculiarly averse to the introduction of foreign sorts, at least in other parts of India. In many parts of Bengal the most promising results are expected, and among us there is not the least difficulty in introducing any kind; our soils and climate seem peculiarly suited to the Bourbon and American cottons, and, so soon as the old prejudices in favour of black cotton soils, to the exclusion of all others for its cultivation, are removed, we may, we think, fairly calculate on rivalling American varieties, the produce of America herself, while our indigenous sorts, raised from similar soils, are often barely worth the trouble of gathering.

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Nothing, therefore, it appears to us, could have been more injudicious on the part of Dr. Lush, considering the situation he holds, and the respect which naturally attaches to his opinions, than their publication; without distinctly and unequivocally, at the very outset, limiting them to the tract of country with which he is acquainted. Again, admitting, as we do, the limitation of the genus *Gossypium* to two or three species, and the marked tendency it exhibits to run into varieties, we would deduce the very opposite conclusion, that, namely, which Mr. Bell has drawn, that this very tendency gives us reason to hope for success, which a plant of a more steadfast kind would altogether forbid, and it certainly seems strange to us, that Dr. Lush has not made more use of his opportunities, to procure varieties suitable to the country he occupies, than his paper seems to indicate. To the fact stated, that the quantity and colour of the fur adhering to the seeds is apt to change, we are inclined to attach considerable importance, when viewed in connexion with changes of staple, and think it a subject worthy of more attention than has yet been bestowed on it, and hope that those who have opportunities will not neglect to bestow the attention it merits. To the question of Mr. Bell, " why does not Dr. Lush mention on what experimental farm he observed the conversion of green-seeded American into black-seeded cotton, and his authority for assuming that the black-seeded cotton was in reality produced from green-seeded American ?"—we would answer, objecting in the first place to the style in which it is couched, that we think Dr. Lush has supplied most sufficient authority for his statement, when he says *I saw it.*

We must now hasten to a conclusion, the importance of the subject having already induced us greatly to exceed our limits. To Mr. Bell we acknowledge our obligations for calling general attention to a subject, in a national point of view of such vast magnitude, and which, under the weight of an authority generally considered even on this side of India unquestionable, might have suffered serious injury from the publication of Dr. Lush's memoir; but, while we thus approve of the motive, we cannot equally commend the style, which all along impressed us with the idea, that Mr. Bell wrote under feelings akin to personal altercation, in place of those more calm and elevated ones, which belong to the philosophical investigation of a great national question. Much indeed do we regret this departure from the decorum which usually does and always ought to obtain in scientific discussion, where individual interests are not at stake, and the simple elicitation of truth is the object aimed at, because we know the " snappish dogmatical and overbearing style" of his remarks has tended to diminish the force of his arguments, and to deprive them of much of the effect they were otherwise calculated to produce. On such an occasion the purity of Dr. Lush's motives ought to have been respected, as much as he (Mr. B.) wished his own to be. Dr. Lush was aware that many fruitless and expensive attempts had been made to introduce exotic cottons into Bombay, and he had made many himself; anxious at length to discourage such unprofitable labour, he drew up and published his memoir, neither the arrangement nor style of which are, in our opinion, we confess, the best suited to make the desired impression; and he has, we think, besides erred in generalizing too much : but, in spite of these defects, we do not see that Mr. Bell is justified in accusing him of a wish to repress inquiry, of forming baseless, new fledged theories, of building hobby horses on which he wishes all men to ride as well as himself, for that is the meaning of the passage, though somewhat differently expressed. Dr. Lush has merely detailed the result of his own experience, as any other man would do, and left others to choose for themselves. What else does Mr. Bell do, with this difference in favour of Dr. Lush, that he draws his conclusions mainly from his own experience, in place of from that of others. That Dr. Lush has established his case with respect to India generally, which by the way he does profess to do, we are far from thinking; and even doubt whether his views will ultimately be found to hold good for the tract of country to which they more immediately refer: but, not wishing to fall into the error which we complain of in him—excessive generalization—we presume not to offer any opinion on a country, with the nature of whose climate and capabilities we are personally unacquainted.

We would, however, entreat Dr. Lush to continue his experiments, and furnish somewhat fuller details of the sources of failure, the better to enable us to guard against them, as well as those circumstances which we may expect to operate in our favour, and which, skilfully taken advantage of, may finally ensure success. The characters of the soils, especially with reference to their retentiveness of moisture, as well as their usual state of dryness, or the contrary; their depth, and the qualities of the sub-soil, and whether wet or dry; the nature of the climate, especially with reference to the frequency of rain, and the usual length of the intervals of dry weather; and whether the American varieties were tried on soils apt to crack and yawn during seasons of drought.

In Coromandel, a few trials were sufficient to satisfy experimenters, that the black soils were altogether unsuitable for either the Bourbon or American varieties. For the former the red loamy soils of the interior, that never crack, have been found most suitable, but it thrives equally well on the gray loamy soils of the coast. The American kinds have been found to thrive in similar soils, but the staple is inferior; it answers well on alluvial soils adapted to the cultivation of rice, but does not require irrigation. It has not we believe been sufficiently tried on sandy saline coast soils, but may be expected to succeed well when tried. The success which has attended trials in such situations, the equal facility of culture with the original country cotton, and the great additional value of the product, bid fair to ensure a rapid spread of this kind of cultivation. Have similar soils been tried on the Malabar coast, and been found equally unsuitable there with the black ones? On this side of the ghauts we believe we may with safety state that irrigation is never employed, unless perhaps occasionally when disappointed of the usual supplies of rain immediately after the sowing season, and before the young plants have acquired substance enough to resist the protracted drought; but, generally, the lands employed are so situated as to preclude the possibility of watering.

Dr. Lush estimates the cost of cultivating perennial cotton at from twenty-five to thirty per cent. more than the annual kinds. It is desirable to know how he arrives at this conclusion, since, on this side of India, the perennial system is usually preferred, as the cheaper mode of cultivation, owing to the great saving of labour and seed which is thereby effected, and still more from the larger crops reaped in the second and third years than the first. Has it been sufficiently tried in Malabar, especially with reference to those sources of profit?

These are a few of many points which still remain to be inquired into, and on which we should wish Dr. Lush to favour us with the results of his experience; and should he think this periodical a suitable channel for making them known, the Society, we feel sure, will gladly receive them. We make this request with a view to elicit information, and therefore trust that all particulars relating to experiments may be as detailed as possible—general results, unaccompanied by a full exposition of the steps by which they were arrived at, we consider insufficient; for the soil, climate, and other contingencies affecting the result of experiments undertaken in Coromandel, in imitation of those made in Malabar, are so different, that unless they can be modified, according to some fixed principle, they may lead to most opposite conclusions.

Tobacco.—The next most important series of papers on commercial agriculture are those on tobacco, but these will not detain us long, as two principal ones have been already re-published in our Journal—that, namely, of Mr. Piddington on soils, and of Mr. Royle on the cultivation of tobacco in India. The others consist of a report on tobacco roduced from Virginia seed at the Society's late farm of Akra. The eport is drawn up by dealers and manufacturers of London, who delare the sample in question the best "Indian tobacco they had ever een," and consider it worth from 6*d.* to 8*d.* per pound.

Madras, we believe, now supplies the English market with tobacco o the extent of about one thousand chests annually, the whole of which ells in bond at these prices. This is excellent encouragement, as we elieve the average price of real Virginian tobacco does not exceed hat amount, and we have been informed, unless we mistake, that it is placed in the bond warehouse at about 2*d.* per pound, thus affording an average profit of nearly 200 per cent.

Mr. Piddington gives an account of some very good tobacco which he raised on an ordinary dark gray or black soil, and which he, so to speak, manured with iron by putting a handful of "Soorky," (what form of the metal that is we are unable to inform our readers) into each hole when transplanting. The experiment of course must go for nothing, as the circumstances in which it was made were unfavourable, and no comparative trial was made to ascertain the effect of the iron by planting so many more without, and then treating them in all other respects the same.

Some Cabool seed, which was sown in Salem, and treated in the same manner as the Virginia is in that district, produced a fair crop of rich fine tobacco, in spite of the season proving somewhat unfavourable, and the plants being slightly attacked with mildew. We shall probably return to this subject. We cannot close our notice of this volume, so replete with information, without expressing a hope that we may annually have an opportunity of passing in review, and bestowing on each occasion our humble meed of applause, at least a similar volume of Transaction of the Agricultural and Horticultural Society of India.

R. W.

XV.—Selections.

Historical Sketch of the Kingdom of Pándya, Southern Peninsula of India, by Horace Hayman Wilson, Esq. *Boden Professor of Sanskrit, Oxford.*

The following sketch of the history of the principality of Pandya, one of the earliest political divisions of southern India, was compiled several years ago, from documents contained in the manuscript collections of the late Colonel Mackenzie. It was prepared before the completion and publication of my catalogue of those collections, and it was my intention to have revised it at some future period, with the assistance of such further materials as a more thorough examination of its authorities might have supplied. At the same time, I commenced similar epitomes of the history of the other chief states of the Peninsula, purposing in like manner to give them the benefit of future revision and comparison with additional sources of information. Time, however, passes away, and I have not had any opportunity of carrying my intentions into execution. When such an occasion may offer is still uncertain, and I have thought, therefore, that it may not be unacceptable to the Royal Asiatic Society to be put at once in possession of what I have effected, at least as far as relates to the kingdom of Pandya. From my subsequent investigation of the Mackenzie Collection, I do not expect that any material accession to our knowledge of the remote condition of the Pandya kingdom will be derived from it; but, at any rate, so much as is here supplied will, in the mean time, contribute to throw some light upon a dark period of Pandya history, and may pave the way for its more complete and more successful elucidation.*

The historical traditions of the south of India divide the extreme southern portion of the east part of the peninsula, which is termed Drávira Désa, into three principalities, or those of Pandya, Chola, and Chéra. The first of these is the subject of the present inquiry. The early existence of the Pandya kingdom we learn from classical authorities.† At the beginning of the Christian era, the Regio Panlionis, of which Madura was then and ever afterwards the capital, ppears to have comprehended the greater part of the southern porion of the Coromandel coast, and to have extended across the peinsula to Canara and Malabar, and southward to the sea. It was ubsequently confined to narrower limits by the independence of Malabar and the rise of the state of Chéra to the west, by the growth f the principality of Ramnad to the south, and the aggrandisement f the Chola sovereignty to the east, till it sank, in modern times, into he petty government of the Náyaks of Madura. At various periods f its history it may be presumed, the following definitions of its limits ave been laid down by native authorities. One account places Raméwara on the east, Kanya Kumári on the south, Satyamangalam on the west, and the river Palar on the north. Another, which seems the more accurate, makes the Valar river the northern boundary, and Paruvali the western; but agrees with the preceding in carrying the Pandya territory to the sea, both to the south and east, including, consequently, the present Ramnad, and part of Tinivelly.

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* A list of the authorities will be found at the end of this paper.

† The author of the *Periplus of the Erythrean Sea*, particularises Nelcynda, or Neliceram; Paralia, Malabar, or Travancore; and Comari, Cape Comorin; as ὑπὸ τὸν βασιλέα Πανδίονα, under king Pandion. Dr. Vincent conjectures, that the king of Madura had extended his power from the eastern to the western side of the peninsula, and was master of Malabar when the fleets from India first visited the coast (vol. ii. 401). He also thinks it likely that the power of Pandion had been superseded in Malabar between the age of the Periplus and Ptolemy; for Ptolemy reckons Aii next to Limurike on the south, and takes no notice of Pandion till he is past Cape Comorin (ibid). The conjecture derives very strong support from the traditions of these countries. It may be supposed that the embassies sent by Pandion to Augustus, as noticed by classical

The Coromandel provinces on the eastern peninsula, from the Godaveri to Cape Comorin, are described in all the traditionary accounts of this part of India, as one vast tract of forest to which the name Dandaka, or Dandakàranya was applied. It was in these thickets that Ráma and Sitá resided during their exile, that he commenced his warfare against the Rákshasas, or savages and fiends, who divided with hermits and sages the possession of the wilderness, and that Sitá was carried off in resentment of Ráma's successful attacks upon the wild tenants of these shades. After the subjugation of the savage inhabitants of Dandakáranya and the conquest of Lanká, various individuals from the north, it is said, attracted southwards by the performance of pilgrimage to the scenes of Rama's triumphs, were tempted, by the unoccupied state of the country, to settle themselves and their families upon the undisputed territory. They accordingly cleared and cultivated different tracts, and thus laid the foundation of future principalities. To such circumstances the Pandya kingdom owed its rise. An adventurer, named Pandya, of the Velálar, or agricultural tribe, first established himself in that portion of the south to which his

authorities, and which there is no reason to call in question, arose out of the ambitious extension of the territories of the Pandya prince: two occurrences of this nature are noticed, one the 18th year after the death of Julius Cæsar, which reached Augustus at Tarracona; the other six years afterwards, when that prince was at Samos. Et quidem duplex erat illa ad Augustum legatio, cujus utriusque tempus habemus exploratum; prior bello Cantabrico quam Tarracone Augustus accepit, teste Orosio (vi. 21). Secundam deinde legationem anno Varr. 734, assignat Dio (l. liv.), quo tempore Sami hyemavit Augustus. Hos vidit, ni fallor, legatos, Nicolaus Damascenus, Antiochiæ Samum, ut videtur, petentes, teste Strabone (l. xv. p. 719). DODWELL, de Ætate et Auctore Peripli Maris Erythrei, 105.

name was afterwards assigned.[*] This happened, according to the authority followed, in the last *yuga*, or *age*, in which seventy-two princes are enumerated as ruling over the kingdom. Other accounts, however, do not name the founder of the monarchy, but pass over some indefinite interval to the reign of Sámpanna Pandya, whose son, Kúla Sék'hara is, in all the lists, specified as the first king of Madura, from his being regarded traditionally as the founder of that city. It is from this prince that seventy-two kings are enumerated in the list above referred to.[†] Another list,[‡] said to be taken from the *Madura Puráṇa*, but, if so, not very accurately compiled, reckons seventy-five princes from Soma Sundara, the third of the preceding list, to Kuna Pandya, who appears to be its seventy-third. Another list limits the number of kings from Kula Sék'hara to Kuna Pandya to thirty,[§] whilst it is stated generally, in a different authority, that the whole number of Pandya kings who preceded Kuna Pandya, amounted to three hundred and fifty-seven :[‖] it is evident, therefore, that beyond mere names, and those, perhaps, more fanciful than historical, we are not likely to derive much satisfactory information from these conflicting statements. It may, indeed, be observed of such lists,[¶] and they are numerous, that they bear their own refutation when they assert very high antiquity. The names are from the first Sanskrit; but, according to the most able scholars in the languages of the Dekhin, there was a period which preceded the infusion of Sanskrit[**] into the dialects of the south, and the princes of those periods were, of course, not designated by exotic appellations. Either, therefore, the first names of the lists are modern fabrications, or the lists ascend to a comparatively recent date. There can be no doubt, that in examining local lists of Hindù kings in the peninsula, both sources of error, or misrepresentation, are to be taken into account.

The objection advanced against these lists applies equally to all the written records, and is alike fatal to the extreme antiquity of the events which they narrate. The meagreness and inconsistency of the various sources of information might throw a suspicion upon the existence of the Pandya monarchy at any remote period, did not classical writers bear testimony to the celebrity even of its capital city, at the very commencement of our era. How long before this it was founded we have scarcely any means of conjecturing, but the traditional history of the Chola dynasty records the disappearance of that race, as independent princes, to have occurred in consequence of the marriage of a Chola princess with Vara-guna Pandyan, whom it calls the forty-eighth Pandya king. In our lists, however, he appears to have been the twenty-second or twenty-ninth, and supposing the union of the Chola and Pandya sovereignties to have been thus effected before the reign of AUGUSTUS, and the number of preceding reigns not very erroneous, we may conjecture the appearance of the Pandya principality as an organised state, and the foundation of Madura to have happened, about five or six centuries anterior to the Christian era.[*] Of the events that have befallen the kingdom during the long period that has since elapsed, very few are attributed to remote times, and of them the authenticity may be doubted. Such as they are found, however, in the only records that remain we shall proceed to detail them, omitting the most extravagant fictions, and curtailing the most tedious of those which we select.[†]

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[*] No notice of any of the kingdoms of the south could consistently occur in the Ramayana. MANU speaks of the Dráviras as degraded Kshetriyas, but makes no mention of Cholas or Pandyas. Both Chola and Pandya are respectively mentioned in the Mahábhárata, but their origin is not there described. The Harivansa and Agni Purána, make Pandya, Chola, Kerala, and Kola, great-grandsons of Dushyanta, of the line of Puru, and founders of the regal dynasties named after them. The descendants of Dushyanta, however, as specified in the Vishnu Purána, do not include these personages, and their insertion seems to have been the work of the more recent authorities. The Harivansa, with no little inconsistency, places the Pandyas and Cholas amongst the Kshetriya tribes degraded by Sagara. The Padma Purána has a similar addition to the list of those tribes in the Rámáyana.

[†] List of authorities, No. 1. [‡] List, No. 3. [§] List, No. 2.

[‖] Rájá Cherití. List, No. 5.

[¶] Besides those comprised in the Mackenzie Collection, BUCHANAN has published several. (Travels in Mysore). Some of his and those of this collection are the same, having been procured at the same places.

[**] ELLIS and CAMPBELL. Introduction to CAMPBELL'S Telugu Grammar.

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[*] It is not improbable that some centuries preceded the foundation of Madura, during which the first settlers were occupied in clearing the ground and erecting habitations, and forming themselves into organized states. According to the Puránas, as estimated by HAMILTON, ten centuries were thus occupied; but this seems to be more than requisite, and perhaps five would be nearer the truth, placing the first establishments in the south about one thousand years before our era.

[†] The authority followed in the first part of the ensuing detail is called a translation of the *Madura Purána* (List of Authorities, No. 7); it appears to be a translation of the Tamil work called *Tiruvalaiyádal*, which is also designated sometimes as the *Madura Purána*. This is the work of Parunjoti Tamburan, a Pandaram, or Saiva priest, who is said to have written it in the reign of Hari Víra Pandyan, in the Salivahan year 973 (A. D. 1051). It relates the sixty-four miracles or frolics of Sundaréswara, the tutelary divinity of Madura; and is, in fact, but a translation or paraphrase in Tamil of a Sanskrit local legend, entitled *Hálásya*, said to be a section of the *Skanda Purána*, a source always assigned in the Dekhin to detached local compositions, to which the composers wish to affix the authority of Pauranic sanctity. The Skanda Purána being a Saiva Purána, is the ready resource of that sect, and is made the parent of a much more numerous offspring than legitimately belong to it. The *Hálásya* is of this description; but if the date of its Tamil representative be correctly given, it is of use in fixing that of Kuna Pandya, with whose reign it closes. The collection contains two MSS. professing to be translations of the *Madura Purána*: they do not exactly agree, however; and one is much more brief than the other, whence it is possibly the translation of an abridged work, the abridgment not adhering, with inviolable fidelity, to its original, as is usually the case amongst Hindu writers. The MSS. are Nos. 7 and 8 of the List of Authorities. The account of the work and its author, is from a MS. list of Tamil authors, and the catalogue of Tamil books. Another MS., No. 11, which has been also

According to the *Madura Purána*, the residence of the Pandya kings was for many ages at a place called Kurk'hi, not improbably the Kolkhi of the Periplus, a city subject to the Pandya king, as the author observes, and, perhaps, as D'Anville notices,[*] still to be traced in the appellation Kilkhar, or Kilakarai,[†] on the Coromandel coast, opposite to Rámésvaram. One of the Pandya monarchs, named Sámpanna Pandya, invited the Chola and Chéra princes to the wedding of his son. On their way to Kurkhi they were caught by violent rains, and compelled, by the flooded state of the country, to remain encamped on one spot for a month, in memory of which event the Pandya king built a city there, naming it Kalyána-pur, which was for some time the capital of his son and successor, Kula Sék'hara.

Kula Sék'hara, in the commencement of his reign, built a new city about two leagues to the north of Cape Kumari, which he named after himself, Kula Sék'hara Pattan: he resided, however, at Kalyána-púr. It happened that a merchant returning from a journey to Malayálam, or Malabar, lost his way in the forests of Chandragiri, the hilly district west of Madura, and its vicinity. Whilst exploring his track alone he discovered an ancient temple, dedicated to Siva, as the Mula Linga, or Choka Náyaka, and Durga, as Minákshi Amman. The temple had been erected by Indra when performing penance in the Dandaka forest, for the expiation of the sin of murdering Vritrásura, who, although a demon, was a Brahman. The merchant, himself a devout worshipper of Siva, paid his homage to the deity, and was, in consequence, favoured with a personal communication, directing him to announce the discovery to the Raja, and the will of the god, that a city should be founded on the spot. The same injunction was conveyed in a vision to the prince, and the concurrence of these intimations established their divine origin. Kula Sék'hara accordingly repaired to the place, cleared the forest, rebuilt the temple with great architectural magnificence,

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consulted, is entitled a translation of the Pandya Rájákal; the original of this is a Tamil prose work, sometimes attributed to the three most eminent of the first professors of the Madura college Narakira, Bána, and Kapila. The accuracy of this notion may be questioned, as it rests solely upon the work closing with the reign of Vamsa Churámani, under whom these writers are said to have flourished; and it is contradicted by the tenor of the last sentence, which speaks of the literary institutes first promulgated by, or exemplified by these teachers having been communicated to their disciples, and thus handed down through consecutive generations. The work itself agrees closely with the *Madura Purána*, and is, therefore, probably, as well as it, a branch from the same Sanskrit stem, the *Hálásya Máhát'mya*, which work is also in the collection, and has been compared with the translations.—Mackenzie Collection, I. p. 91, cxxi.

[*] D'Anville Antiquité Geographique, 122. Also Vincent's Periplus, ii. 463: the general identity is beyond question by its being then, as now, the scene of the pearl fishing.

[†] See Journal Royal Asiatic Society, No. V. p. 169.

constructed a splendid palace for the royal residence, and founded an extensive and stately city. The gods beheld the progress of his labours with interest, and, on their completion, a shower of nectareal dew descended from heaven, spreading a sweet film upon the ground, which gave the appellation Madhura (sweet) to the new city. The stately monuments, of which the vestiges are still to be seen in Madura, are the work of much more modern times ; but the classical authorities already referred to, establish, for that city, an existence of venerable duration. The gradual transfer of the Pandya capital from a southerly to a more northerly site, is in harmony with the tradition of the country being first cleared and cultivated by pilgrims to Rámêswaram. It may be here observed, that the prevailing form of the Hindú religion in the south of the peninsula was, at the commencement of the Christian era, and sometime before it, most probably that of Siva, as, besides the positive testimony of these legends, the name of the cape, Komári, or Kumári, the virgin, is, as a mythological appellative, restricted to Durgá; and that it was in this place a mythological name is proved by the author of the *Periplus*,* who states, that persons purposing to lead a religious and widowed life bathe at Comar, because, as the history relates, a goddess formerly used to perform her ablutions monthly at this spot.

The second Pandya prince is named Malaya Dhwaja, of whom his extreme devotion to the tutelary divinities of his capital is the only peculiarity recorded.† In return for his attachment, the goddess Minákshi herself became incarnate as the daughter and the successor of this prince.

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* Ἀπὸ δὲ ταύτης ἐστὶν ἕτερος τόπος τὸ Κομὰρ λεγόμενον. ἐν ᾧ τόπῳ φρούρια ἐστὶν, και λιμήν. ἐις ὃν ὁι βουλόμενοι τὸν μέλλοντα αὐτοῖς χρονον ἱεροὶ γενέσθαι, χῆροι μένουσιν ἀυτοῦ, ἐκεῖ ερχόμενοι ἀπολούονται, τὸ δ'αὐτὸ καὶ γυναῖκες. ἱστορεῖται γὰρ τὴν θεὸν ἐκεῖ ἐπὶ μῆνας κατά τινα χρόνον ἐκεῖ ἀπολελοῦσθαι.

PAOLINO says, the convent and the custom still existed in his time.—VINCENT PERIPLUS, ii. 443. See, also, VIAGGIO DI FRA BARTOLOMEO.

† The traditions of the south, however, make him a more important character, and consider him as the father of Chitrángadá, the wife of Arjuna. This opinion is grounded on a section of the Sabhá Parvan of the Mahábhárat, where Sahadeva, whilst performing his military career in the Dekhin, is described as having an interview with his father-in-law Malaya Dhwaja, king of Pandya. This section, however, is perhaps peculiar to the copies of the Mahábhárat, current in the peninsula, as it has no place in a fine copy in Devanagari character, in my possession. In the first chapter, too, it is there said that the father of Chitrángadá is Chitraváhana, king of Manipur, to which Arjuna comes on leaving Kalinga. The Telugu translation of the Adi Parvan agrees in the names of the parties, but places Manipur south of the Kávéri. How far, therefore, it is safe to identify Malaya Dhwaja with Chitravahána, and Manipur with Madhura, must depend upon the verification of the authenticity of different copies of the Mahábhárat. The result of a careful collation of seven copies at Benares, examined at my request by Captain Fell, may be regarded as fatal to the identification, not one of them containing the section in question, or the name of Malaya Dhwaja. The Bhágavat calls the bride of Arjuna, Ulupi, the daughter of the serpent king of Manipura.

Múmulai Tadátaki, the new queen of Madura, was a warlike princess. She subdued, it is said, the whole of the peninsula, and carried her arms over northern Hindustan to the Kailása mountains. Here her victorious career terminated in an event more glorious than her preceding triumphs. She was opposed by no less a person than the god Siva, by whom she was defeated and taken a prisoner. It was now her turn to vanquish: the god became enamoured of her charms and allowed her to return in liberty to Madura, whither he followed her and obtained her hand.* Having assumed a human form of great beauty, the god was known by the title Sundara (the handsome) Pandyan; and although it does not appear how he attained the privilege of giving a cognomen to the emblem of himself, worshipped in Madura, yet the Múla Linga is most commonly known by the name of Sundaréswara, the god of Sundara, which it shares with that of Choka Náyaka.

That this tradition is not wholly without foundation is established by several circumstances, if we look to its implied rather than to its literal import. It is not improbable that the worship of Siva was introduced into the peninsula from northern Hindustan some few centuries before the Christian era, and that, in the reign of one of the early princes of Madura, it was established in that city. The tradition which peoples the peninsula from the north of India, and the existence of the Saiva faith there, coeval with the era of Christianity, are fully in harmony with the account given of Sundara Pandyan. In further confirmation of the native country whence the Tamil faith was derived, it may be observed that Sanskrit, which, in Drávira Désa, as in every other Hindu country, is the language of religion, is always called by Tamil writers Vádá Mozhi,† the northern speech, and, finally, the learned writer from whom the remark is taken, observes, that the literature and religion of the Brahmans were brought by them into the peninsula from northern Hindustan.‡ Whether this occurred at so early a period as the one now under discussion may be doubted, although some of the circumstances we have adverted to are in favour of the supposition. That there are, on the other hand, reasonable bounds to its antiquity cannot be disputed; for, besides the inference derivable from the traditions relative to the colonisation of the peninsula, we have the testimony of Menu,[*] that the Draviras were classed with the impure, or outcast tribes, when those institutes were compiled; and, even in the Mahábhárat, the people of the southern countries appear to be considered as scarcely Hindus.

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* The legend relates, that the princess was born with three breasts; the centre one was to disappear when she met with a suitable spouse, and, accordingly, vanished upon her encountering Sundaréswara. Images of the goddess, with three breasts, are still seen amongst the sculptures at Madura.

† Ellis's Dissertation on Malayalam, p. 3, note.

‡ Ibid, p, 26.

Sundara and Minákshi, after a reign of some thousands of years, resumed their celestial characters, and returned to heaven. They were succeeded by their son, Wugra Pandyan, who, as the offspring of Siva and Dévi, was, of course, an incarnation of Kártikéya. Eastward of Madura is the mountain Tiruparumkunru,[†] whence fell a stream, named Sarovara Vaikál. Agreeably to the system of local adaptation which seems to have especially prevailed in the Dekhin, and which transferred the names of sacred places in the north of India to others in the south, this mountain became another Kailása, and the stream, another Ganges. The scene and chief actors being thus identified, we are not to be surprised that the birth of Wugra should have been here attended with the circumstances narrated by the Purànas of the birth of Skanda, or Kártikéya, and that this site acquired the honours of a Tirt'ha, or place of pilgrimage, under the presidence of Subrahmanya,[‡] another name of Kártekéya, who was, from a remote date, a favourite deity with the nations of the peninsula.

Wugra Pandyan, being of such exalted origin, was engaged in conflicts proportioned to his rank, and, after subduing the kings of earth, waged war against the king of heaven. Indra, being discomfited by him, was compelled to grant the showers which he had forborne to shed upon the Pandya kingdom. Wugra was married to Kántimati, the daughter of the Chola king, and by her he had Víra Pandyan, who succeeded him.[¶]

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[*] Book x. 5.

[†] The most famous place under this appellation, Subrahmanya Kshetram, or Tirt'ha, is in the province of Canara. A hill to the south of Madura, denominated, from ideas connected with this superstition, Skanda Malai, the Mount of Skanda, another name of Kártikeya, or Subrahmanya, has suffered a very curious change, Skanda Malai being converted into Sicander Malai, the hill of Secander, or Alexander. Les naturels croient que le médecin ordinaire d'Alexander le Grand y a été enterré. LANGLES, ii. 11. A native account says it is the tomb of Alexander himself; an idea, no doubt, introduced by the Mohammadan Fakirs, of whom many reside on this hill, and attach a profitable sanctity to the small tomb, once a temple of Skanda, now the shrine of Secander. To the Hindus it is equally sacred, as it is said to contain in one of its caves an image of Skanda, which they go to worship.

[‡] This appears, however, from some accounts, to be the same as Skanda Malai (MS. No. 80), which is three or four miles south-east of Madura.

[¶] One account, the Raja Cheritra, vol. vi., makes great confusion with this prince and his predecessors. It calls him Alaka, and makes him the father of Minakshi, married to Chokanath, and of Alyarasani, married to Arjuna. At the same time he is described as the son of Malaya Dhwaja, and grandson of Sundara, an order of descent very different from all the other authorities.

Víra Pandyan was killed, whilst hunting, by a tiger: he left many sons by the women of his household, and one, the youngest, by his queen, whom the ministers placed under the tutelage of the Chola monarch, to secure him from the treachery of his elder brothers. When old enough he was conducted to Madura, and installed; upon which, his brothers fled to Chera; they do not seem to have given him any subsequent molestation. This prince was named Abhishéka Pandyan; he was succeeded by Vikrama, of whom no traditions are given; and he by Raja Sek'hara,* in the time of which latter, it is said, the Chola prince led an army of Samánals, or Buddhists, against Madura. He was defeated; but no consequences of his repulse are recorded. The next sovereign of Pandya-desa is named Kulottunga, in whose reign we have abundant legends illustrative of the might of Choka Nátha, but nothing that can be conjectured into history. He was succeeded by his son, Anantaguna, in whose reign the kingdom was again invaded by the Samanal; but, with the aid of Siva, the assailants were repulsed. On this, as on the former occasion, the heretical invaders are conducted by the Chola monarch, whose seat of empire is called Kánchí, or Conjeveram. That the territories of the Chola prince lay higher north than the modern Tanjore there is probable evidence in óther manuscripts, as, also, that Conjeveram was included within his dominions. That it was the ancient capital of Chola is, however, quite irreconcilable with all the local accounts which have been procured of that empire, and the foundation of Kánchí itself appears from them to be an event of comparatively recent occurrence. The same accounts, however corroborated by the vestiges of Bauddha architecture, found still abundantly at Conjeveram, attest the prevalence of that faith there for some considerable period. This might have been the case at the time the legendary tales which profess to record the Pandya history were compiled; and hence, these supposed religious aggressions emanating from the Chola monarchs of Conjeveram. That frequent contests between the Chola and Pandya princes occurred in remote periods there is no reason to doubt; but it is not quite so certain that the particular occasions are specified with much accuracy, or that hostilities, embittered by religious differences, disturbed the tranquillity of the Dekhin some centuries before the Christian era.

Anantaguna was succeeded by his son, Kula Bhúshana, in whose reign, it is said, in the Pandya Rajakal, that the Pandya kingdom was invaded by Kiráta Raja, sovereign of Chédí, but it can scarcely be supposed, that by this is intended the country usually identified with Chédi, or Chandail, in central Hindustan. The appellation, Kiráta, assigned to the Raja, indicates a mountaineer, the wild inhabitant of thickets and fastnesses, subsisting by plunder and the chase; and in the Tiruvaleyádal, the invader is designated with more consistency, as the Sétu Raya, the prince of Marawa, the district lying east of Madura along the sea-coast, and which would, therefore, appear to have been an independent principality in ancient as well as modern times. The minister, Sundara Sumantra, had been provided with funds to levy a force to oppose the invaders, but he appropriated the money to the worship of Sundarèswara, and the invaders had nearly reached Madura before any troops were collected to resist them. In this predicament the minister had recourse to the god, and a miraculous host, representing the contingents of the fifty-six kingdoms of India, was immediately created for the defence of the kingdom. Against such combatants no chance of success remained for the invaders, but Kiráta, or the Marawa Raja, was removed even without their aid. He was killed by a lion sent by Siva,* and, upon his death, his followers fled in confusion to their native haunts. The result of this invasion was, therefore, only an accession of honour and devotion to Sundarèswara and Minákshi Dèví.

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* All the lists agree in inserting Vikrama's name. The translation of the *Tiruvalyádal* omits him making Raja Sek'hara the son of Abhisheka.

In the reign of this prince another marvel is recorded, which merits notice only so far as it accords with the general traditions of the origin of Conjeveram. Kántára Kháta Chola is said to have cleared the woods which covered that part of the peninsula; built the city of Kánchí on the site; and erected the pavilion and temple of Ekámbarèswara and Kámákshi-Dèví, the forms in which Siva and Durgá were worshipped at that city until very recent periods. In recompense of this prince's devotion, Siva conferred upon him aerial locomotion with the speed of thought, and thus enabled him to transport himself every morning to Madura, to pay his homage at the supreme shrine of Sundaréswara—a rather indifferent compliment to his own tutelary divinity.

Kula Bhúshana left two sons, Rájendra and Rájasinha, of whom the first succeeded to the throne. The Chola prince of Kánchí, Kantára Kháta, or, as he is named in the Madura Purana, Kandavetti, proposed an alliance with Rájendra, by giving him his daughter in marriage, to which the Pandya prince assented, and sent his brother, Ràjàsinha, to conclude the negociation with the Chola prince. The ambassador, however, prevailed upon that monarch to wed his daughter to him instead of his brother, and to co-operate with him in an attempt to drive Ràjendra from the throne. The confederate princes marched towards Madura for that purpose; but they were encountered by the Pandya king, defeated, and taken prisoners. Ràjàsinha was detained in confinement during the rest of his life, but the Chola monarch was released and dismissed with civility to his own dominions.

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* The scene of this event is laid by the *Tiruvaleyádal*, in the forest Tirupúvanam, at a place dedicated to Siva, as Purána-lingam, ten miles south of Madura.

Saundarya Páda Sek'hara, the son of Rajendra, succeeded his father. Like his predecessors, he is said to have been engaged in hostilities with the Chola monarch; and, whatever we may think of the circumstantial details of these repeated conflicts, it seems not at all improbable that a struggle for supremacy in the peninsula did exist, at a remote date and for a long period, between these rival dynasties, which terminated in the temporary ascendency of the Pandya monarchs. On this occasion it is related, that the Pandya king was forced to fly before his invaders, but their prince was drowned in the pursuit of his defeated foes, and the kingdom of Madura was thus preserved from foreign subjugation. Of course, the accident was not a mere casualty, but was brought about by the seasonable interference of the tutelary deities of Madura. Saundarya Pàda died soon after his return to his capital, or, as it is said of every Pandya prince, he went into the *edytum*, or inner chamber, of the temple of Múla Linga, and was united to the god. If we do not suppose that this was a contrivance of the priests to get rid of those princes of whom they were tired, or with whom they were dissatisfied, we must conclude the ceremony to have been part of the religious institutes of the kingdom, and that the princes and persons of note were carried to the temple, to die in the presence of the tutelary gods, in the same spirit as that which, in Upper Hindústàn, conveys the expiring individual to breathe his last upon the banks of the Ganges.

Varaguna, the son of the last prince, succeeded. His reign contains the usual proportion of marvels; but nothing of a historical character in the authorities hitherto followed. This omission is the more remarkable, as the Chola records ascribe the disappearance of the series of their princes to the transfer of the kingdom to Varaguna, by his marriage with a Chola princess, as has been noticed above:* and the union of the two principalities under a common sovereign appears to have actually occurred about the period at which this prince may possibly have reigned. The fact is supported by another authority, however, and a cheritra, or history of Varaguna,[*] states his repulsion of an invasion by the Chola king, Karàvar Chola, his subsequent conquest of that kingdom, and its annexation to the Pandya monarchy. A celebrated poet, named Bàna, or Pàna-patra, is said to have flourished in this prince's reign.

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* According to the *Chola Désa Púrvika Charitra Vyakhyanam*, Váraguna was the son of Balachandra Pandyan. His wife was the daughter of Kulottunga Chola. Their descendants occupied the united Pandya and Chola kingdoms, for twelve generations and five hundred and seventy years.

Vara Raja, or Raja Rajendra, succeeded Varaguna. In his reign a ridiculous legend is narrated; which so far merits recapitulation, that traces of it are frequent in the sculptures still visible at Madura.

At Kuruvaituri, west of Madura, a rich farmer had twelve sons, who spent their time in various sports, and especially in the chase. They one day attacked a wild hog and his family, killed some, and pursued the rest to the vicinity of a holy sage engaged in profound meditation. Having disturbed the abstraction of the sage, he cursed them, denouncing their future birth as hogs themselves. On their humiliation, however, and earnest prayers for forgiveness, he so far modified his imprecation as to make the temporary degradation the means of future honour and fame.

The twelve youths being reborn in their porcine capacity, lost their tender parents by the spears of Raja Rájendra and his fellow-sportsmen, whilst they were yet too young to provide for their own subsistence. Their pitiful state moved the compassion of Choka Náyaka and Minákshi Amman, who happened to be in the forest during the chase, and they determined to act as the parents of the porkers. Minákshi officiated as their nurse, in which character figures of her occur, and Choka Náyaka as their tutor, One effect of this divine protection was to humanise their bodies, so that they became men with the heads of pigs, in which combination their statues are sculptured.[†] Another consequence of their fortunate destiny was their deriving from their preceptor profound conversancy with arts, sciences, and letters, and their consequent advancement to the ministerial administration of the affairs of the Pandya kingdom.

The reign of Raja Rájendra is followed by an interval which is imperfectly filled up in most of the authorities by a mere string of names. The enumeration does not exactly agree in all cases; but in those which are the most authentic, it appears to extend to twenty-four or twenty-five princes. If we allow twenty years to a reign, and admit the accuracy of the enumeration, we should place the prince who succeeds these shadows in the second century of the Christian era: at the same time, as the data are altogether insufficient, it is obvious, that any conclusions advanced must be subjected to a considerable latitude, and that, consequently, the real date of Vamsa Sek'hara's accession cannot be determined with any degree of accuracy. It is quite sufficient to bring it within some moderate limits, and to place it not only upon this computation, but on various other grounds, in the early centuries of our era.

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[*] List, No. 13.

[†] They are described as occurring in Tirumalla Náyak's *Choltri*, by Mr. BLACKADER, Archæologia, vol. x 457; and his description is translated in LANGLES' Monumens de l'Hindoustan. Instead of ministers, however, Mr. BLACKADER calls them princes of the palace; and M. LANGLES converts them into *huissiers de la chambre*.

At whatever period it may have occurred, the accession of Vamsa Sek'hara seems to have been the result of some political disorganization of the Pandya kingdom, as the different authorities concur in considering him as the founder of a new dynasty. The *Madura Puráṇa* describes him as the first prince who reigned after the recovery of Pandyam from the waters which had deluged the world, and as receiving from Múla Linga, instructions for the readjustment of the limits of the kingdom; in which latter account the different authorities concur. They also agree in representing him as the founder of the fort and palace of Madura, of various temples and public buildings, and as the restorer or enlarger of the ancient city. It is not improbable, that the extensive remains of these buildings still in existence, and calculated by their massiveness to defy the unassisted effects of time, are, in part, relics of the works of Vamsa Sek'hara. The fort of Madura is at present about three miles and three-quarters[*] in circumference, and includes the ruins of the palace, the temple of Choka Nat'h, and the Choltri of Tirumalla Nayaka. The latter is a modern building: and the same period witnessed considerable additions to the palace, which, probably, occasioned the mixture of Indian and Saracenic architecture observed by Daniel; as, in the fifteenth and sixteenth centuries, the latter seems to have been introduced from Persia by the Mogul emperors, and engrafted upon the square and massive, although florid, style, which may be regarded as exclusively Indian. This style is evident in the pagoda of Choka Nat'h and its adjoining arcades, and bears testimony to their claims to very respectable antiquity. Vamsa Sek'hara is said to have also re-established, or possibly he introduced, the practice of carrying the god abroad, on particular festivals, in large cars magnificently ornamented, and dragged by the people.[†]

The reign of Vamsa Sek'hara was also distinguished by an event which led to important consequences to the literature of the peninsula, and which is one reason for placing his reign in the earlier ages of Christianity. This was the foundation of a College at Madura, for the cultivation, it would appear, of profane literature and the Tamil language. The different authorities agree in this account, dividing the merit of the act between Vamsa Sek'hara, and his son and successor,

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[*] Hamilton's India, vol. ii. p, 469.

[†] Le Père Bouchet au Père * * *, Lettres Edifiantes, vol. xiii. p. 126; Blackader, Archæologia, vol. x.; Daniel's Oriental Scenery; and Langles' Monumens de l'Hindoustan, vol. ii.

Vamsa Churàmani, also called Champaka, who, probably, completed what his father only commenced.

The professors of the Madura college were at first forty-eight in number, called the *sangattár*, or assembly. The chief of these were Narakira,[*] Bána, and Kapila, of whom no works remain. These received instructions in the *Sútras*, or rules, of the Dravira language, it is said, from the god Siva himself, who appeared amongst them as the forty-ninth professor, and enabled them to expound and propagate the primitive institutes of the language, which are invariably attributed in the Dekhin to the Muni Agastya. The cultivation of the Tamil language, as has been noticed above, is supposed by Mr. Ellis to have preceded that of Sanskrit in the south; and this would be a circumstance in favour of the early existence of the *sangattár*, for it could not have been long after the Christian era that the fables of Northern India were domesticated in the peninsula. However, the opinion evidently is correct only within certain limits. The Sanskrit language, in prayers, hymns, and legends, must have accompanied the introduction of the Saiva faith anterior to the Christian era, and must have been cultivated as far as it was connected with religion. Its profane literature, and even its Pauranic mythology, may have subsequently become objects of study; and they apparently superseded the cultivation of the native tongue, till the eighth or ninth century after Christianity, when its revival was effected, as we shall hereafter have occasion to notice.

The prominent figure which Agastya is thus made to assume in the literary history of the south of India, attaches an interest to his existence which, it is to be apprehended, will scarcely derive much satisfaction from the accounts of this sage which are recorded. In the first place, a high antiquity must be assigned to him on the authority of the *Rámáyana*, the oldest work, after the *Vedas*, perhaps in the Sanskrit language. His migration to the south is there detailed;[†] and, disregarding the fabulous motives assigned for his residence there, it seems not a forced conjecture to infer his being a chief agent in diffusing the worship of *Siva* in the Dekhin. Neither this remote date, nor his character as a foreigner, renders it likely that he was the first Tamil teacher; and if we are not allowed to suppose that this character originated in his legendary reputation, we must conclude that the author of the various works attributed to Agastya was a different individual, although of similar name. There are still many works current attributed to Agastya, besides his grammatical aphorisms. These consist of poems in praise of Siva, and a number of medical works.* It is not very probable, however, that the appropriation is generally correct.† At the first institution of the Madura *sangattar*, it would appear that some dispute arose immediately between the professors and the Saiva priests, connected, not impossibly, with that contention for pre-eminence of knowledge which has ever prevailed in the Tamil countries between the Brahman and inferior castes.‡ The priests, however, proved the more powerful; and a reconciliation took place between them and the literati of Madura. At least, we may thus interpret the legend of Narakira incurring the wrathful glance of Siva, and only escaping being burnt to ashes in the flames emanating from the eye in the forehead of the god by plunging into the holy pool Pattamàri, and there composing the Andàdi Pànyam, a poem in honour of Siva. After this event the parties continued upon good terms; and Siva presented to the professors a diamond bench of great critical sagacity, for it extended itself readily for the accommodation of such individuals as were worthy to be upon a level with the sages of the *sangattar*, and resolutely detruded all who pretended to sit upon it without possessing the requisite qualifications. In other words, the learned corporation of Madura resembled learned bodies in other countries, and maintained as strict a monopoly as they possibly could of literary reputation.

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[*] I have already observed the *Pandya-Rájákál* is ascribed to them, apparently erroneously. To Narakira is assigned the tale of *Alakésa*, or king of Alaká, and his four ministers; but the style is unfavourable to its supposed origin,—Tamil works being difficult in proportion to their antiquity, so that the oldest are now unintelligible to ordinary scholars.—Kindersley's Hindù Literature, p. 47.

[†] In the Aranya Kándam.

The foreign transactions of Vamsa Sek'hara's reign were limited to a war with Vikrama, the Chola prince, who besieged Madura, but was repulsed with the aid of Siva. The son of this prince was more fortunate; and he was engaged in disputes of no more serious a nature than those which were engendered by the rivalry of his literary dependents.

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* One of these, the *Agastyar Vaidya Anguru*, is cited by Dr. Ainslie, Preface to the Materia Medica of Hindustan.

† In a manuscript account of Agastya, in the Collection, List, No. 14, thirty-eight works attributed to him are said to be still current. His grammar is, however, said to be lost, in consequence of a curse denounced upon it by Tulagappyam, the disciple of Agastya, according to some legends. In a MS. written by an intelligent native, and already referred to under the title of *Chola Pùrvika Charitra Vyákhyanam*, it is said, that the reputed invention of the Tamil language by Agastya is very improbable, as, in the medical works uniformly ascribed to him, the style indicates a very confined possession of the language; and as to the *Agastyam*, or Grammatical Institutes, said to be lost, there is little reason to suppose it was ever written, as least by Agastya, as he never mentions it, although he states in his *Gnyánam*, or work on theology, that he has written a lack of sentences on theology, an equal number on alchemy, and two lacks on medicine. These inferences are scarcely questionable, as applied to an Agastya of, perhaps, the eighth or ninth century; but the traditions that ascribe the introduction of letters and religion amongst the people of Drávira to an earlier teacher of that name, do not seem to have originated wholly in imagination.

‡ Ellis on the Málayálam Language, p. 26.

From Vamsa Churámani,[*] we have again a considerable interval without the specification of events as well as names, until the reign of Kuna Pandyan. There are, however, one or two legends which are variously appropriated, and which may, therefore, be employed to fill up the chasm.

The fifteenth prince from Vamsa Churámani is called in the lists Kulása, who was also a patron of literature, and a man of letters himself. This latter character induced him to treat a man of great acquirements, named Yeddakattan, with disrespect. Yeddakattan complained to the deity Sundaréswara, and, withdrawing from Madura to the north of the Vaiki river, was followed by the god, and by the professors of the college. This desertion bringing the king to a sense of his improper conduct, he had recourse to prayer and solicitation, and appeased the offended god, and the more irritable poet; and the temple and college recovered their inmates.

Kulasa was succeeded by his son Arimerddana, celebrated for his illustrious minister Mànikyavàsaka, who was especially instrumental in re-establishing the Saiva worship, and expelling the Bauddhas. The authority of that MS. which appears to be the abridged *Madura Purána*, associates this minister and this king; but the larger work relates the marvels usually narrated of Manikyavasaka, of Tennaven Paramaràya, minister of Vamsa Sek'hara, identifying these two persons. There can be little doubt, however, that Mànikyavàsaka, whether he were a political character at all, was long subsequent to Vamsa Sek'hara; and it is only a question, how much more modern he may be regarded. He is anterior, it appears, to the reformers of Kuna Pandyan's reign, by the testimony of both our authorities and others, of which one places him A. D. 490, and another states his work to have been written above a thousand years ago.[†] In his life, it is particularly stated that the sectaries he combated were Bauddhas, not Jains, who were the heretics of Kuna Pandyan's reign; and these concurrent considerations warrant the inference, that he may be placed with safety between the fifth and eighth century of the Christian era. We need not detail the marvels recorded of him, as that has been fully and correctly done by a European writer already.[‡] His works, which are said to be very difficult, are the *Tiruvásagam* and *Tiruchittambala-*

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[*] With whom the *Pandya Rajakal* closes, as observed above. So does the translation of the *Tiruvaleyadal*; but the original descends to Kuna Pandyan, as does the *Halasya*, filling up the interval, however, with mere names. MS., No. 8, gives the substance of their contents.

[†] Life of Mánikyavásaka, MSS. No. 15; List of Tamil Authors, MSS. No. 9; Vadur Sthala Máhátmyam; Mackenzie Collection, vol. i. p. 201.

[‡] SONNERAT's Voyages.

kavi, poems in praise of the Saiva worship.[*] The scene of his contest with the Bauddhas was at the temple of Chidambaram, and his opponents chiefly teachers from Ceylon,[†] the king of which country, it is said, was present at the controversy. The Bauddha disputants, it is asserted, were converted to the orthodox faith, and no persecution appears to have ensued.

Another barren series of names occurs between Arimerddana and Kuna Pandyan, who appears as the twelfth successor of that monarch. According to some traditions, the date of Kuna Pandyan is called 950 of Salivahana, or A. D. 1028;[‡] but there are several reasons for supposing this to be erroneous. The *Madura Purana*, and its original, the *Hálásya Máhátmya*, come down to the end of this prince's reign; and they are attributed to the reign of Hari Vira Pandyan, in 973, giving an interval of but twenty-three years for their composition, and for the bold assertion of marvels which it could not be supposed they would venture to advance at a period so close to the realities thus distorted. Either their date, therefore, is erroneous, or that of Kuna Pandyan is incorrect; but there is every reason to suppose they are not much misplaced, as the zeal of the Saiva priests and writers to whom these and other compositions of the same period are evidently to be assigned, was, no doubt, particularly active in and about the ninth century. Again, the chief instrument in the religious revolutions of the Pandya state that occurred in this reign was a Saiva priest, Gnyana Samandar,[§] whose works, and those of his first converts and disciples, Appa and Sundar, are well known in the south, and are uniformly referred to the ninth century;[||] whence it follows that we must place Kuna Pandyan about that time. The date derives some confirmation from its agreement with the period when the Jain religion, of which Kuna Pandyan was a votary, had grown into credit in the neighbouring regions.[¶]

Whatever may have been the date of this prince, it appears that prior to his reign two events of some importance had occurred in the

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[*] Account of Tamil Works, No. 9; and List of Tamil Authors, No. 10.

[†] Life of Mánikyavásaka.

[‡] List of Tamil Authors, No. 10.

[§] WILKS, on the Authority of a MS. in the Mackenzie Collection, calls him a Pandaram, or Sudra priest of Siva (vol. i, p. 156). This does not appear, however, from any of the MSS. consulted on the present occasion. Gnyána Samandar Charitra, Mackenzie Collection, vol. i. p. 203, App. xix.

[||] They are joint authors of the *Tévaram*, hymns in honour of Siva.

[¶] The earliest Jaina inscriptions of an authentic character that have been found are those of kings of Humchi, dated Salivahana 804, 819, 820, &c. To them succeed the grants of the Belal kings in the eleventh and twelfth centuries.

Pandya kingdom, which are, not improbably, connected, although the connexion is not adverted to in any of the native accounts. These are the abolition of the *sangattar*, or Madura college, and the establishment of the Samanal religion.

The abolition of the *sangattar* is narrated in the usual marvellous manner.[*] A candidate for the honour of a seat on the bench of professors, appeared in the person of Tiruvalavar, a pariah priest of Mailapur,[†] and the author of an ethical poem. The learned professors were highly indignant at his presumption, but, as he was patronised by the raja, they were compelled to give his book at least the trial. For this purpose it was to find a place upon the marvellous bench, which the professors took care to occupy fully. To their astonishment, however, the bench extended itself to receive the work, and the book itself commencing to expand, spread out so as to thrust all other occupants from the bench. The raja and the people of Madura witnessed the scene, and enjoyed the humiliation of the sages; and the professors were so sensible of their disgrace, that, unable to survive it, they issued forth, and all drowned themselves in a neighbouring pool. In consequence the establishment was abandoned.

If we contemplate this event in a literary view alone, we need not be at a loss to understand it. The first professors were eminent in Tamil composition, for the cultivation of which the college appears to have been founded. The members, however, had subsequently, in all probability, directed their attention more to Sanskrit composition, and had, at all events, neglected the cultivation of their native literature. That the latter was the case, is evident from the remark of Avayar, that the old Tamil was preferable to the new;[‡] indicating that, even in the ninth century, the dialect had been so far neglected as to have become partially obsolete. With Tiruvalavar, however, circumstances changed. The old system was subverted, and a new impulse was given to the study of Tamil, which produced, in the course of the ninth century, in the Pandya and Chola kingdoms, a number of the most classical writers in the Tamil tongue.[§]

The date at which the subversion of the college occurred, is another subject of enquiry, and, if we trust to the tradition which connects it with Tiruvalavar, we must identify it with the period of his existence. Other legends make him a brother of *Avayar;* but, as this family story is altogether fabulous,[*] no stress need be laid upon the assertion. The MS. list of Tamil authors states his work to be 1600 years old: and Mr. Kindersley, who has translated a prose version of part of it,[†] mentions that the original is understood to have been written fourteen hundred years ago. He also notices the extreme difficulty of the style, from which a high antiquity may be inferred; and, from these considerations, we may conclude that the age of Tiruvalavar may have been between the sixth and ninth centuries.

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[*] Account of the Madura Sangattar, vol. 16.

[†] St. Thomé. Possibly, therefore, something of an attempt to propagate Christianity is here blunderingly and imperfectly narrated.

[‡] Asiatic Researches, vol. vii.; Dr. JOHN on the Life and Writings of Avayar.

[§] As Gnyana Samandar; Appa and Sundara, above noticed; Avayar herself, and Kamban, the translator of the *Ramayan*.

As far as we can judge from the extracts of the *Kadal*, which have been translated, we have some reason to suppose that their author was not a very orthodox member of the Hindu faith. He appears to have advocated moral duties and practical virtues above ceremonial observances and speculative devotion, and so far trespassed upon the strict law. By his allusions to the heaven of Indra, and to various parts of the regular pantheon, as well as the respect he inculcates to Brahmans and ascetics, he does not appear to have been a seceder or a sectary. How far, therefore, he contributed to the introduction of the Jain, or Bauddha faith, into the Madura monarchy, may be doubted, although the diffusion of his doctrines was calculated to undermine the Brahmanical system. At any rate, it is agreed that the kings of Madura had adopted sectarial principles, and that Kuna Pandyan was a follower of the Samanal doctrines, intending by those the Jain faith; although the term will apply also to that of Buddha, with which there is equal reason to identify it.

Some traditions assert that this heresy was introduced from Ceylon. In that case it was the faith of the Bauddhas. The same also aver, that when the heretics were banished they were exiled to that island,—a legend leading to the same conclusion. On the other hand, the expulsion of the Bauddhas from India appears to have been the work of earlier periods, whilst the remaining records of the kings of Húmchi, and the Belal princes, shew that in Mysore the Jain religion was established at this period; and at Madura, the first converts of Gnyana Samandar are usually considered to have been Jaina authors. We may, therefore, consent to call the religion of Kuna Pandyan, Jaina; but the truth seems to be, that neither Jaina nor Bauddha doctrines ever gained an extensive footing in the southern divisions of the peninsula, which have maintained from the earliest to the latest periods an undeviating fidelity to the worship of Siva and the Lingam.[‡]

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[*] It is detailed at length by Dr. John.

[†] Extracts from the *Tiruvalavar Kadal*, or *Ocean of Tiruvalavar*.—Kindersley's Hindu Literature. See also Extracts from the same, or *Tiruvalavar Koral*, by Mr. Ellis; Mackenzie Collection, vol. i. p. 232.

[‡] Some of the traditions of the Jainas assert, that Chamunda Raya, who erected the image of Gomateswara, was minister of Raksha Malla, a king of Madura, in the year of Kali 600. This account is rendered suspicious by the antiquity of the date, even if we

Kuna Pandyan was married to Vani Daswani the daughter of the Chola Raja, who was a devout worshipper of Siva.* She invited Gnyana Samandar, a famous teacher of her sect, to Madura, and an opportunity soon occurred of gaining for him the countenance of the Raja Kuna, who was attacked by a fever which resisted the drugs and spells of his Jaina priests. Gnyana Samandar undertook his cure, engaging to make his success a test of the superiority of his religion. His opponents accepted the challenge; and the medical skill of the Saiva surpassing their expectations, they found themselves vanquished. Attributing the success of Gnyana Samandar to magic, they proposed other tests, to which he readily agreed. Leaves, with the sacred texts of their respective parties were thrown into the Vaiki, under a stipulation that the sect should triumph whose *mantra* floated upwards against the current. The Saiva charm prevailed: it ascended the river to a place called Tiruvedaka, where Siva, in the form of an old man, took it out of the water, and brought it back to Gnyana Samandar. In commemoration of the event, a city was founded on the spot to which the leaf was borne, and a temple was erected by the king to Tiruvedaka Nat'h. The Samanal were persecuted and hanged, or banished, to the number of eight thousand. Kuna Pandyan, who before his conversion was deformed, as his name implies (Kuna meaning "hunch-backed"), no sooner received the initiatory *mantra* of the Saiva faith, than he became erect and straight, and thenceforth assumed the name of Sundara (the "handsome") Pandyan. Gnyana Samandar was established as the chief pontiff of the religious faith which he had restored; and he seems to have instituted a peculiar hierarchy which still subsists, several convents being found in the south of India tenanted by Brahmacharis, or cœnobites, of the Saiva persuasion, whose spiritual head bears the hereditary title of "Gnyani Siva Achari."†

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suppose the Kali, or fifth age of the Jainas, to be intended, by which the date will be reduced to about thirty years B. C. Besides, in the published account of this place and image by Colonel Mackenzie, the country of the minister and king is not mentioned (A. R. vol. ix. p. 263), except in a general way, as lying in the south. Chamunda Raya, in another place, is called a king of one of the Chola or Belala races (p. 246). There is nothing in the local traditions of Madura to warrant the assertion. The princes of the name of Malla, it may be observed, reigned in the Carnatic and Mysore in the eleventh and twelfth centuries; and an inscription of a grant by Raksha Malla, printed in the *Asiatic Researches* (vol. ix.), is dated Sal. 1090, or A. D. 1173 (p. 431).

* In an account of the Gopuram of the Bauddha temple at Pûdcovaily, this lady is named Mengayakarasi, and called the daughter of Kerikála Chola, who ruled, it is said, A. D: 478.

† Account of the Gnyana Siva Acharis, MSS. No. 17. Colonel Wilks, as observed before, identifies these with the Pandarams, or Jangamas, but this is very questionable. They do not seem to be known as a religious order above the Ghats. In the Carnatic the name has been adopted within the last fifty years, I understand, by a set of Saiva teachers, who officiate as the priests of the blacksmith caste.

The chief and primitive establishment of the order is said to have been founded at Tinnivelly, but it has since been destroyed. It is asserted, that there have been one hundred and thirteen successions of the chiefs of this religious order; a series which would reasonably allow a period of ten or eleven centuries since its first establishment, and so far corroborates the view of Kuna Pandyan's date in the eighth or ninth century of the Christian era.[*]

The approximation thus made to modern times, is not attended with any great improvement in historical precision. The great outline is clear enough, but the details continue imperfect. In the ninth and tenth centuries, the Chola princes extended their power throughout a great portion of the peninsula, and overshadowed the splendour of the neighbouring kingdom of Pandya. To them succeeded the Belala princes of Mysore, before whose ascendency the ancient honours of Pandya, and the later glories of Chola disappeared. The decline of the Belalas failed to restore the older dynasties to their pristine authority, as, during the period of their depression, the provinces and chieftainships, once attached to these states, had taken advantage of their weakness to assume independence. This disorganised condition of the southern states was perpetuated by the confusion and alarm incident upon the Mohammedan aggressions which began in the fourteenth century, and which were followed close by the extended dominion of the Vijayanagar kings, whose officers finally established themselves, in the beginning of the sixteenth century, in the seat of the Pandya monarchs. Their history has been recorded with something like accuracy and consistency, and sheds a ray of light upon the close of the Madura chronicles. But, before we particularise the events ascribed to these princes, we must advert to the transactions which fill up, however imperfectly, the interval between the reign of Kuna Pandyan and supremacy of the Nayaks of Madura.

According to one authority, which brings down the Pandya history from the earliest to the latest periods,[†] the first series of monarchs, consisting of seventy-two princes, was followed by another of twelve, with the last of whom, Kodocola Pandyan, the succession of Pandya princes of the ancient royal family, ceased. According to the legend, this king unjustly condemned to death a merchant of Congeveram, whom business had brought to Madura. Upon hearing of his fate his wife followed him to that city, where, ascending a funeral pile, she denounced an imprecation upon the place and its sovereign. In consequence of this denunciation, Madura was shortly afterwards almost wholly consumed by fire, and the king and all his family perishing in the flames, the Pandya dynasty was destroyed.

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[*] Mons. Langles (Monumens de l'Hindoustan, vol. i. p. 98), observes of Kuna Pandyan, that his expulsion of the Samaneans must have happened after the middle of the twelfth century. His authority is the History of the Danish Missions; and the grounds of the estimate are not stated. The same work says Kuna Pandyan was the three hundred and fifty-ninth king of a dynasty of three hundred and sixty-two; it seems, therefore, that the compilers of the Danish History, have had no better guides than those we have access to, and that, consequently, no particular weight attaches to their deductions.

[†] Account of the Pandya Rajas who reigned at Madurapuri, No. 28. See List, No. 1, series 2.

The twelve princes of this list apparently commence with Kuna Pandyan, under his new title of Soma Sundara, and should, therefore, advance to the eleventh century at least; but it may be doubted whether it is very accurately compiled. A distinguished name in Tamil literature is that of a Pandya prince, who is sometimes called Hari Vira, and at other times Adi Vira Pandyan. He is the reputed author of various translations from Sanskrit,* and is said to have flourished in 973 of Salivahana, or A. D. 1041; and his name is not found in the list here referred to, or in any subsequent ones, although there is no great reason to question the correctness of his supposed era. There are, indeed, corroborative proofs of its accuracy. A history of the kings of Konga, after that country had become subject to the Chola princes, gives an account of a war between Vira Pandyan and Divya Raya, in which the former was defeated and taken, and had his ears cut off. And in the next reign, the Chola army advanced to Madura and took the city, the Pandya prince saving himself by flight. He was restored subsequently by the Chola monarch, on account of the relationship subsisting between them, but appears thenceforward as a subordinate and tributary prince. These events are placed by the Konga history† in the end of the tenth century, which is as near to the traditionary accounts of Hari Vira's date as we can well expect. Perhaps it is not very unreasonable to connect the tradition above cited of the conflagration of Madura, with the account of its capture in the Konga history, and to infer that they both relate to the same events; or the occupation and partial destruction of the capital, and temporary subversion of the state by foreign invasion, in the beginning of the eleventh century.

The history of the kings of Pandya relates, that the overthrow of the dynasty was succeeded by an interval of anarchy, the duration of which is not specified. At the close of the period the throne was taken possession of by an adventurer, the son of a Brahman by a dancing girl, and a native of Kolam, near Madura, who assumed the name of

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* The Kasi Khanda of the Skanda Purana, the Kurma and Linga Puranas, and the Naishadha.—*List of Tamil Authors.*

† Konga Desa Raja Cheritram, translated from the Tamil, 18.

Chandra Kula Dwipa.[*] He was succeeded by fourteen princes, in the reign of the last of whom the province of Madura was first assailed by the Musalman arms; an occurrence which enables us to form some estimate of the dates of preceding transactions.

The first Mohammedan invasion of the Dekhin occurred in the reign of Alla-ad-din in 1293. The first army that crossed the Krishna[†] was led by Kafur, or Malek Naib, in 1310-11; and, as he carried his conquests to Rameswar, the work cited may possibly refer to this incursion. According to another authority, the event was dated in 1325, which is sufficiently near, unless, which is not improbable, the allusion blends the first and second invasion together, in which last Mujahid Shah,[‡] in 1374, overran the countries between Vijayanagar and Cape Comorin, and advanced to Rameswar. In either case we have a period of less than three centuries assigned to fifteen princes, which would leave no very disproportionate average for their reigns, except that, as the whole season was one of tumult and disorder, and as the rulers were usurpers and intruders, they must claim considerably less than the average duration which might be assigned them in tranquil times, and under long prescriptive sway.

Any deduction to be made from the average duration of the reigns in question, may partly be filled up by the period of anarchy which succeeded the destruction of Madura. How long this continued does not appear; nor, indeed, can its existence to the full extent of the authority here followed be admitted. The sovereign of Madura, deposed by the Chola prince, was subsequently restored by him; and in the inscriptions of the Belala race, in the eleventh and twelfth centuries, it is said, they made the kings of Madura their tributaries.[§] It is probable, therefore, that legitimate princes of the ancient house continued to sit on the throne of Madura, some time after the capture or conflagration of their capital, till, weakened by foreign aggression and domestic disobedience, they finally yielded to the enterprise of an adventurer, and the establishment of a new dynasty.[||]

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[*] List, No, 1, series 3.

[†] Scott's History of the Dekhin, Introduction, p. xiii.

[‡] Ibid. vol. i. p. 42.

[§] As late as the reign of Vira Narasimha (1149 to 1172).

[||] Toward the end of the thirteenth century, Marco Polo calls the king of that part of the peninsula opposite to Ceylon, and the site of the pearl fishery, Sender Bandi. Il (Re) principale che é capo della provincia si chiama Sender Bandi, nel suo regno si pescano le perle. Marsden conjectures Chandra Bandi may be understood to signify the "slave or servant of the moon," 627, note 1257; but the Madura records furnish us with a much more obvious derivation. The king Sender Bandi may possibly be the Chandra Pandi, or Pandya of the text. If this is not thought satisfactory, it may be a slight corruption of the hereditary title of the prince of Marwar, in whose boundaries the pearl fishery lies, and who has been for a long period past entitled the Setu Pati, or Lord of the Bridge; the ridge of rocks between Rameswar and Manar.

The invasion of the Musalmans was attended with the downfal of the usurping dynasty; and, after a short interregnum, a prince, descended from the ancient rajas, was placed upon the throne with the assistance of the Canara people, it is said; but, probably, the Raya of Vijayanagar is intended, to whom, at an early period of that empire, or shortly after the middle of the fourteenth century,[*] the Pandya kingdom probably became tributary. The prince placed upon the throne was named Soma Sek'hara, and he was followed by a series of seventeen princes to Chandra Kumara Pandyan, when an officer of Krishna Ray established the line of Telinga princes, generally termed the Naiks (Nayakas) of Madura, and abolished the shadow of authority retained by the Madura kings over a portion of the ancient kingdom, now restricted almost to the boundaries of the capital.

Besides the earlier encroachments made on the east and north by the Tanjore princes, and on the west by the Belal rajas, the interval that elapsed between the Musalman invasion, and the establishment of the Vijayanagar Nayakas on the throne of Madura, had witnessed the separation of the southern provinces from the ancient dominion of the Pandya kings; and, particularly on the eastern coast, the extensive districts of Ramnad and Marawa, became, and ever afterwards continued, independent of the Pandya sovereignty, of which, for many ages, they had formed important divisions.

After the establishment of the chiefs of Marawa or Ramnad, as independent princes, adulatory ingenuity was employed to devise for them an honourable origin. The founder of the family was accordingly made contemporary with Rama, who having, after his conquest of Lanka, erected a *linga* on the small island opposite Manar, which was thence denominated Rameswar, consigned the hereditary charge of the deity and temple, and superintendence of the pilgrimage, to the Adi Setu Pati, or first lord of the causeway.[†] The effort to aggrandise the ruling family here ceased; and, during an uncertain and protracted interval, the supposed descendants of this chief continued, it is admitted, dependents and servants of the Pandya monarchy. A few years after the irruption of Mujahid Shah, or about 1380, the governor of Ramnad threw off his dependence on Madura; and his successors extended their authority to the neighbouring provinces, since called the Great and Little Marawas. Family dissensions, fostered by the Nayakas of Madura, or Tanjore, subsequently divided these districts into separate chieftainships; and the aggression of their neighbours, as well as their domestic feuds, prevented the power of the Setu Pati from ever acquiring a permanent or consolidated form. The Telinga princes of Madura, and the Mahratta rulers of Tanjore, claimed, and occasionally exercised, the supreme authority; and latterly, the Nawabs of the Carnatic assumed a sway which in general was little more than nominal. Finally, the Madras presidency collected the tribute of the two Marawas from the year 1792, and in 1801, by treaty with the Nawab of Arcot, obtained the complete sovereignty.*

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[*] One account (Sketch of Madura History, No· 19) says, the country was governed from 1370 to 1402 by Mysore viceroys, when two chiefs, named Ellakana and Mathuna, held it till 1448; then resigning it to a prince of the old dynasty. That the Mysore or Belala princes exercised a supremacy over Pandya, is unquestionable, but it must have been earlier than the period here mentioned, as by the first date (1370) the Belala power had been overturned. The authority exercised by them and the Vijayanagar kings, too, did not, probably, involve the removal of the native princes; and this probability is converted into certainty, as far as affects the latter, by the appearance of inscriptions in the name of Vira Pandyan, one of which is dated 1402 Sal., in the fifth year of his reign, and a subsequent one in the fifteenth, or Sal. 1412 (A. D. 1490); a short time, therefore, before the final eradication of his family.

[†] General History of the Kings of Ramnad, or the Setu Pati Samasthanam, 20; Memoir of the Setu Pati, 21.

The Setu Pati was not the only prince who, in this distracted state of the kingdom committed encroachments on its territorial possessions; and even the adjacent province of Tinnivelly was detached from its connexion with Madura, under the administration of the Nayaks. This dependency was, however, recovered; but it subsequently was occupied by an independent Poligar, till the Nawab of the Carnatic extended the pretensions of his authority over this part of the peninsula, which, along with the rest of his rights, were converted into substantial possession by the British government. Besides Ramnad and Tinnivelly, a variety of petty chieftains assumed independence; and, upon the occupation of Madura by the first Nayak, five Rajas are said to have combined to revenge the wrongs of the ancient dynasty of Madura. These petty chiefs were the ancestors of some of the Poligars of the south, who gave so much trouble to the British forces in the middle of the last century. Others originated with grants made by Viswanath Nayaka, about the middle of the sixteenth century, to the rebel leaders who had co-operated with the Vijayanagar arms in the final overthrow of the Madura monarchy.† Of these petty chiefs living by plunder and violence, the native lists enumerate seventy-two in the Tinnivelly and Trichanapali districts. Their numbers must, of course, have been subject to perpetual fluctuation, and increased or diminished with the absence or existence of any one preponderating power amongst them. The nature of their habitations, in the bosom of unhealthy and almost inaccessible wilds, gave, however, a certain security to their existence; and the efficiency of the native government was never such as to accomplish their suppression. Through a period of three centuries therefore, the southern portion of the peninsula was parcelled out amongst a number of petty chiefs, scarcely to be dignified even as commanders of banditti;* their predatory followers preferring a system of insidious pilfering to open plunder, and rarely venturing, without decided superiority of number or position, to face an enemy in the field. Too indolent to till the soil, too insecure to desire fixed property, they lived by hunting and robbery, and were, therefore, but little disposed to check the luxuriance of rank vegetation, which yielded them at once subsistence and shelter. It is not surprising, therefore, that the countries which the Poligars occupied should have been overrun with inhospitable and noxious forests; and, it may be concluded, that had not a wise and powerful policy interfered to enforce the habits of social life, the fine districts to the south of the Kaveri, most admirably fitted by nature to support an industrious population, would have reverted to the state in which tradition describes them long anterior to Christianity, and would once more have become a suitable domicile for none but the goblins of Ravana, or the apes of Hanuman.

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* HAMILTON, vol. ii. p. 473.

† MUTIAH'S History of the Nayakas of Madura, 22.

The princes of Vijayanagar had established their supremacy over most of the countries south of the Krishna river before the sixteenth century, but they appear in general to have left the native princes in possession of their local sovereignties, and to have contented themselves with enforcing an acknowledgment of their paramount dignity, and exacting in times of emergency pecuniary and military aid. Such was the case with the Pandya and Chola kingdoms, which were governed in the reign of Krishna Raya of Vijayanagar by their own kings. A war broke out between Vira Sek'hara, the Chola, and Chandra Sek'hara, or Chandra Kumara, the Pandya prince, in which the Madura monarch being worsted, he was compelled to fly his country, and, in this distress, had recourse to Krishna Raya for protection and assistance. An opportunity of this nature was not likely to be disregarded by the Vijayanagar court, and Nagama Nayaka, overseer of the royal cattle, was despatched with a considerable force to reinstate the Madura prince, and punish the ambitious presumption of the sovereign of Tanjore. The task was easily effected; and Chandra Sek'hara seated on the throne of his ancestors. His restoration, however, was but nominal, as Nagama Nayaka retained the sovereign authority in his own hands, keeping the king of Madura in confinement, and disregarding the commands and menaces even of Krishna Raya, who found his successful general converted into a rebel.

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* The state of the countries, and the characters of their Collaries and their other inhabitants, are well described in Orme's History; and their unaltered condition, at a period a little subsequent, is concisely and clearly described by Fullarton. The extent and dreary aspect of the thickets, as well as the ferocious manners of the people, are also the subject of frequent and interesting description by the members of the Catholic missions, which were sent to this part of India between the end of the seventeenth and the middle of the eighteenth century. See Lettres Édifiantes et Curieuses, vols. x. to xv. The Collars have several peculiar customs contrary to those of the Hindus, particularly the frequency of remarrying allowed to the women, either upon voluntary separation from their husbands, or their death. This custom exists with very few exceptions (MS. Accounts of the Collaries, 25, 26). The pre-eminent power and stability of the *tondiman*, as the principal Poligar chief is called, has introduced a bias to Hindu habits; and his wives having sometimes been known to sacrifice themselves on the funeral pile, the fashion has gained ground in his dominions. The Collars are chiefly worshippers of Siva and Kali. They are not very rigid in their diet, drinking spirits and eating flesh and fish. The lax observance of the Hindu practices, which prevailed formerly amongst these tribes to a greater extent than at present, may partly furnish a reason to believe that the extensive proselytism effected by the Madura missionaries in these districts was not altogether a fiction. It appears, indeed, that amongst the thirty thousand Christians under the Madura mission, was included a considerable portion of the *calaris*, or thieves. "Je me mis sous la conduite de ce guide qui me fit bientôt quitter le grand chemin pour entrer dans le pays de la *caste des voleurs*. On la nomme ainsi parce que ceux qui la composent faisoient autrefois metier de voler sur les grands chemins. *Quoique la plupart de ces gens-la se soient faits Chretiens*, et qu'ils ayent aujourd'hui horreur de l'ombre même du vol. ils ne laissent pas de retenir leur ancien nom, et les voyageurs n'osent encore passer par leurs forêts. Les premiers missionaires de Maduré furent *assez heureux de gagner l'estime de cette caste* de sorte qu'à present il n'y a guerès de lieu, ou nous soyons mieux reçus et plus en suretè que dans leurs bois."—Du Père Martin au Pére le Govien, Decembre 1700, vol. x. p. 160.

The valour and conduct of Nagama Nayaka rendering the officers of Vijayanagar reluctant to undertake his chastisement, he seemed likely to maintain his newly acquired authority in perfect impunity.* To the surprise of the Vijayanagar court, however, an antagonist to Nagama was found in the person of his only son, Viswanath ; a son whom he had performed a pilgrimage to Benares to obtain, and whom he had left for education, or who had not improbably been detained as a hostage, at Vijayanagar. As Viswanath Nayak had given many proofs of his military talents, and as his professions of loyalty were credited, he was accordingly intrusted with the unnatural duty of revenging his prince upon a father, and marched with a strong force against Nagama. The father was defeated and taken prisoner, and, according to one account, delivered to Krishna Raya by Viswanath, who replaced the legitimate king of Madura on the throne, and returned triumphantly to Vijayanagar, where, in consideration of the merits of the son, the father was forgiven. The king of Madura soon after dying, and leaving no heir, Viswanath Nayak was installed by the sovereign of Vijayanagar as feudatory prince of Madura. Another history of Madura, however, omits these circumstances, and describes Viswanath as the officer sent to the assistance of the Pandya prince, and the usurper of the independent sovereignty. At any rate, it is evident from the tenor of both accounts that Viswanath Nayak first established this dynasty, and that his assumption of the regal authority was acquiesced in by the court of Vijayanagar, too much occupied in watching the proceedings of their new neighbours of Bijapur* to attend to the affairs of the more southern districts.

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* The materials for the history of the Nayaks of Madura, although not very full, are, as far as they extend, satisfactory. They are, 1. A History of the Modern Kings of Madura, by TRIUVERCADU MUTIAH, an ingenious native of the Carnatic, an amusing account of whose studies, written by himself, is published in the *Asiatic Annual Register*, for 1801; 2. A History of the Telugu Rulers of Madura, translated by Mr. WHEATLEY from the Tamil; and, 3. A Sketch of the History of Madura, to the reign of Trimal Nayak, Nos. 19, 22, 23. A fourth account (24) is confined to the affairs of the descendants of Vijaya Ranga Choka N at'h, who died in 1731. It is drawn up by the representative of the family, Vijaya Kumara Viswanath Bhangaru Trimala Nayak, the great grandson of the last Nayak of Madura.

After the inauguration of Viswanath Nayak, he proceeded to strengthen himself in his new government; and, with this view, having enforced the cession of Trichanapali from the Chola Raja, he improved the fortifications of that stronghold, and built a palace in the fort for his reception. He then directed his attention to the settlement of Tinnivelly and the southern districts, the depopulated parts of which he distributed amongst his adherents, chiefs of the Totia caste, to the number of seventy-two, who were the progenitors of the petty chiefs subsequently known as Poligars. This measure, however, and resentment for the extirpation of the ancient royal family, seem to have aroused the remaining chiefs of that principality to arms, and a force, led by five rajas connected with the Pandya dynasty, opposed the further progress of Viswanath. The quarrel was, however, decided by the personal conflict of that chief with Agra Pandyan, who was selected as the champion of the enemy, and was killed in the combat. According to one of our histories, Viswanath survived his victory but a short period, dying of his wounds on the ensuing day. According to another account, he recovered, and continued to reign long enough to extend and consolidate his power.†

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* Established as an independent state in 1489 by Yusuf Adil Khan.—SCOTT, vol. i. p. 207.

† Although the two histories agree in the main facts, they differ considerably in the details, and especially in the chronology. MUTIAH's account places Viswanath's accession, A. D. 1560, the other, A. D. 1431. The former of these best agrees with Krishna Raya's date, and with the previous history of Madura: it may be about forty years too modern. MUTIAH's history enumerates but eleven princes between 1560 and 1742, or one hundred and eighty-two years; the other names fourteen princes in three hundred and seven years,—the former giving about seventeen, the latter twenty-two years to a reign. But this proportion is too much, as three of the fourteen princes are three brothers who reigned consecutively, and the average of whose reigns could not, therefore, have exceeded half this number. We shall have a more probable result, if we suppose the number of princes to be, including Nagama, fifteen, and the number of years two hundred and twenty-two, from 1520 (for Krishna Raya, ruled from 1509 to 1530) to 1742, which will give us something less than fifteen years to a reign. Colonel WILKS says, the dynasty of the Nayaks of Madura was founded

The second prince of Madura, Peria Krishnapa Nayak, the son of Viswanath, succeeded his father. He extended the authority of the new family towards the south, reducing to subjection the Poligar of Permagúdi: he enlarged and beautified Tinnivelly, and built a village to the south of Palamcota, called after his own name Kistnapuram. And here, as well as near Tinnivelly, he built a temple of Siva, and a range of dwellings for the residence of Brahmans, attaching to both liberal endowments.

The third prince of this race was the son of the preceding, Peria Virapa Nayak, who emulated his father in extending the authority of Madura, and in founding temples and endowing religious establishments.

The succession of the Nayaks is here differently stated, Motiah's History passing to a second Krishnapa Nayak, calling him the son of the last prince, whilst the other account states that Peria Virapa Nayak left three sons, Viswapa, Kumara Krishnapa, and Kasturi Rangapa, all of whom succeeded in regular order to the government. The last was succeeded by Krishnapa, who was the son of the second brother, Kumara Krishnapa, and until whose reign no particular transactions have been thought worthy of being recorded.

The most remarkable incident of this reign was the formal acknowledgment of the Poligar of Ramnad, as the sovereign of the eastern coast. This event must have taken place at the end of the sixteenth century; and the accounts of Marawa assert the independency of the founder of the sovereignty about two centuries sooner. They agree, however, with the histories of Madura, in admitting, that about this period, Wodeya Deva was recognised by the king of Madura as the legitimate ruler of Ramnad, and warden of Rameswar; and there can be little doubt, therefore, that the power of the Marawa rulers first assumed a consistent form at the period here described. They were not, however, entirely independent, as, although authorised to extend their authority over their refractory and predatory neighbours, they were required to pay tribute to the Madura government; and they were especially enjoined to give protection to the pilgrims to Rameswar against the Colars and Marawars, who had been accustomed to plunder and harass these devotees upon their passage, so as almost to have deterred the people of other parts of India from undertaking so perilous a journey.

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by Nagana Naid (or Naik) about 1530, in the reign of Achyuta Deva, with the aid of a colony of Telingas, which seems to have been planted in the country some time before by the government of Vijayanagar. The descendants of those are the Poligars of the present day, who are undoubtedly of Telinga, not Tamil, origin (vol. i. p. 54, note). Their introduction is differently stated in the authorities followed in the text.

Virapa Nayak succeeded his father. According to one account, Trichanapali was first attached to the government of Madura in his reign, having previously belonged to the state of Tanjore, from which it was obtained by exchange, the fort of Vellam being ceded to that state in lieu of this citadel. The transaction is uniformly so described; but it is referred by other authorities to the reign of Viswanath, the first Nayak, as already noticed, or to that of Tirumalla Nayak, the successor of Virapa.

The accession of Tirumalla Nayak, the son and successor of the last prince, brings us to a period of chronological certainty, and is placed by the different authorities within two or three years of the same date, or 1621, 1623, and 1626. The reign of this prince was long and flourishing, and the public edifices erected during his sovereignty still furnish splendid proofs of his wealth and magnificence.

The affairs of Ramnad form the most important transactions of this reign. Kutan Setupati, the son of Wodeya Deva, who had succeeded his father, left, upon his death, four legitimate sons, and one illegitimate. Of the first, the third son succeeded his father, but the fourth, Adi Narayan, disputed his possession of the country, and, with the assistance of his son-in-law, Tiravadeya-vanni, a man of great military enterprise and ability, appears to have deposed his brother, and made himself master of Ramnad. The illegitimate son of Kutan, named Tumbi, had recourse to the court of Madura, and easily prevailed upon Tirumalla Nayak to send an army under his general, Ramapya, to put him in possession of what he claimed as his inheritance, a portion of the Marawa principality. Whilst Tiruvadeya-vanni lived, the troops of Madura were successfully resisted; but, upon his dying of the small-pox, a casualty ascribed to the incantations of his enemies, Ramapya overran the country, and taking Adi Narayan prisoner, carried him to Madura, where he was detained in close confinement.

Tumbi Setu Pati was now sole master of Ramnad, but the people contemning the baseness of his birth, withheld obedience to his orders, and, breaking out into open rebellion, he was glad to seek safety again in the court of his patron. The eastern districts were now without a ruler, and the same dangers that formerly prevailed once more obstructing the pilgrimage to Rameswar, the Brahmans and religious mendicants solicited the restoration of Adi Narayan to the government, as calculated to re-establish order and security in the country. Tirumalla complied in some degree with their request; but, acting upon a maxim which has constantly influenced eastern politics, as well as those of more civilised regions, he gave to Adi Narayan, with his liberty, but a third part of his patrimony, leaving another third in the hands of Tumbi, and conferring the rest on Danu Kanta, the son-in-law of Adi Narayan.

This division of the Marawas, although it laid the foundation of future partitions, did not at that time long continue. Tumbi contrived to put his brother to death, but soon after dying himself, his portion was seized by Vijaya Raghunath, the adopted son of Adi Narayan, who, likewise, gained possession of the state of Danu Kanta upon his death, and thus re-united the three governments under one head. This prince, although he extended his authority over the adjoining districts, continued obedient to the authority of Tirumalla; and, upon the invasion of Madura by a formidable army from Mysore, was highly instrumental in their repulse, leading, with an activity which received the acknowledgment of the Nayak, a considerable force to the assistance of his lord paramount, and mainly enabling him to defeat and expel the invaders.

Although the fortress of Trichanapali was the chief stronghold of the kingdom of Madura, the city of Madura appears to have been the favourite residence of Tirumalla Nayak. We have already ascribed to a much older prince the original construction of the fort, the temple, and palace, of which such stately vestiges still exist. There is no doubt, however, that they owe much of their present form to the taste of Tirumalla Nayak, and the palace of Madura especially shews indications of modern architecture; at the same time, the more celebrated building, still in good order, the Choltri of Tirumalla Nayak, known to be his work, is an edifice purely Hindu, and blends the square and massive character of the general structure with the singularly minute decoration, and luxuriantly fantastic development of the details. The Choltri is a chamber of an oblong square form, the flat roof of which of long stones, rests upon one hundred and twenty-four pillars of stone twenty feet high, and placed in four rows. The pillars are curiously carved with different figures representing stories connected with the Hindu religion, the peculiar legends of the *Madura Purana*, and the persons of the founder, and his predecessors. One pillar represents Tirumalla Nayak himself, with six of his wives, and a number of the women of his haram. The Choltri, it was said, was begun in the year 1623, the second year of the founder's reign, was finished in twenty-two years, and cost above a million sterling. It was built, it is asserted, to receive the Lingam of the great temple ten days in every year, the Brahmans agreeing to bring their divinity forth upon condition of Tirumalla Nayak's providing a suitable place for his temporary accommodation. Besides this Choltri, the same prince is said to have completed three other great works—a pagoda; a tank, three quarters of a mile square, twenty feet deep, and faced with stone; and a grand palace ornamented with black granite pillars, some of which are twenty feet high cut out of one stone.*

The reign of Tirumalla Nayak was of considerable duration; one account says forty years; another, thirty-six; and the lowest computation, therefore, brings it to the year 1657,† when he was succeeded by his son Virapa, a prince of an effeminate and indolent disposition, and who, accordingly, was unable to repress the incursions of the Mysoreans, under so active a prince as Kanti Deva Nana Raj. They took several places in the western districts during this reign from the Madura Nayak.‡

Chokanath Nayak succeeded his father; he was a prince of some conduct and enterprise, and rendered himself formidable to all his neighbours. He first turned his arms against Vijaya Raghava, king of Tanjore, whom he defeated and put to death, taking prisoner his ally, Surya Deva, the Setupati, and assisting Kilavan, the cousin of the captive prince, to become master of Ramnad. He then invaded the kingdom of Mysore, expecting to reduce it under his authority, but the events of the war reversed his expectations, and inflicted severe losses on the government of Madura.

The son of the late king of Tanjore, Chengamal Das, had made his escape from the fort of Trichanapali, where he had been confined. His escape was effected probably with the aid of Rustam Khan, a Mohammedan chief, who had been a favourite of Chokanath, and who commanded the garrison under the orders of Mudala Rudra Nayak, the brother of Chokanath, an extravagant and indolent prince, who lavished on his personal gratifications the sums destined for the pay of the troops. Taking advantage of their discontent, Rustam Khan liberated himself from all controul, and made himself master of Trichanapali. This event, with the escape of Chengamal Das, encouraged the Raja of Chenji to advance to Srirangam, whilst the raja of Mysore on that side now became the aggressor. In this state, Chokanath found some difficulty in preserving the shadow of his former power, and his enemies retained the superiority for a considerable period, the Mysoreans occupying even the capital, Madura, it is said, for three years.[*] It was probably to purchase their retreat that Chokanath ceded to Mysore the districts of Errur and Daraper.[†] Having thus got rid of one of his most powerful enemies, and being vigourously reinforced by Kilavan Setupati, he next dispersed the troops of Chengamal Das, and re-occupied Tanjore. He finally recovered Trichanapali from Rustam Khan, who lost his life in the defence; and the Chenji Raja retreating to his own capital, Chokanath remained in the tranquil possession of his patrimonial possessions. He soon, however, lost his acquisitions in Tanjore, the fugitive prince, Chengamal Das, having recourse to the Mahratta chief, Ekaji, for assistance. That adventurer, who commanded at Bangalore, under the nominal authority of the Mohammedan court of Bijapur, readily undertook his protection.[‡] The confederates marched to Tanjore, and soon expelled the forces of Madura. The Mahratta, presently usurping the sovereignty of Tanjore, was not at leisure to prosecute his success against Chokanath; and these princes very shortly afterwards entered into a mutual confederacy to oppose the incursions of Sevaji.[§] These events, which are usually placed between 1675 and 1680, are in perfect conformity with the period of the reign of Choka Nayak as stated in the authorities we have followed, and which date its termination in 1685 or 1687.

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* BLACKADER'S Account of the Buildings at Madura, Archæologia, vol. x. Views of the Choltri, &c. have been given by DANIEL, and LANGLES' Monuméns de L'Hindoustan.

† It must have been in the early part of this reign that the Portuguese Jesuits, under ROBERT DE NOBILIBUS, established the Madura mission, although a liberal benefactor to the Brahmans; therefore, Tirumalla Nayak could not have been a bigot. There were two Christian churches in the city of Madura.—*Lettres Edifiante*, xiii. 130.

‡ As Denaikan-cotta, Satyamangal, and other ta'alluks.—WILKS, i. 54. These aggressions are dated 1653 in the History of Mysore, but, as it is said, they were taken from Virapa, Naik of Madura; and, as the character of this prince renders such an event probable, it is most likely that Colonel WILKS's date is a few years erroneous.

Chokanath Nayak was succeeded by his son, Ranga Krishna Muto Virapa, who died young, after a reign of seven of eight years, leaving his wife pregnant with a son, afterwards named Vijaya Ranga Chokanath Nayak. During his minority the regency was exercised by Mangamal, the grandmother of the prince, a woman of great talents and manly spirit. One account describes her as preserving her authority until 1712, but another[‖] states, that when the prince was thirteen years of age, the commander of the forces, Kasturi Ranjya, excited an opposition to her which ended in his seizing the reins of government, and in her confinement until her death, which speedily followed. We know, however, that in 1700, she was regarded as the ruler of Madura for her grandson, although the administration of the affairs of the state was in the hands of a governor, or regent, who exercised unlimited authority.[*]

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[*] Mutiah's History. The fact is confirmed by the *Lettres Edifiantes*. One, dated 1719, observes of the Christian churches at Madura,—Ces Eglises furent tout à fait renversées lorsque la ville fut prise et ruinée en partie par le Roi de Mayseur. Vol. xiii. p. 131.

[†] Wilks, i. 58.

[‡] This is rather differently narrated in the Pratapa Vamsavali Bhosla. There it is said the prince of Trichanapali applied to Shahoji for assistance against Vijaya Raghava, prince of Tanjore. That Shahoji enabled the Raja of Trichanapali to repel his enemy and capture Tanjore, but that he then appropriated the conquest to himself, expelling his ally from the country, and leaving it under the administration of his son, Ekoji.

[§] Wilks, i. 78.

[‖] Mutiah's History.

The reign of Vijaya Ranga Chokanath Nayak was not distinguished by any remarkable event. He died in 1731,[†] leaving no child; he was, therefore, succeeded by his wife, Minakshi Amman, who adopted Vijaya Kumara, the son of Bhangaru Trimal Nayak, a descendant in a direct line from a younger son of Tirumalla Nayak. This adoption was enforced by the law of the country, so that Minakshi Amman was in fact only regent during Vijaya Kumara's minority. The adoption was generally acceded to by the ministers and men in authority, but it was disputed by Bhangaru Tirumalla Nayak, the father of the youth: he claimed the inheritance to the throne, and his claims were powerfully supported by the activity and influence of his years and rank. The parties are described in one account as having come to an indecisive engagement; but it is admitted that the matter was, with much less policy, referred to the Nawab of Arcot, who sent his son, Sufdar Ali, and Chanda Sahib, with an army to hear and decide the disputed question. The cause was discussed at Trichanapali, and the general bias leaning to Bhangaru Tirumalla Nayak, he was placed on the throne, presenting three lacks of rupees to his Mohammedan friends, and acknowledging himself the tributary of the Nawab of Arcot.

The same means that had secured a favourable award for the successful candidate, were now employed to procure a reversion of the sentence, and a nazzer of a crore of rupees, it is said, prevailed on Chanda Sahib to undertake the cause of the Rani. These negociations becoming known to Bhangaru Nayak, he quitted Trichanapali, and endeavoured to secure himself in Madura and Tinnivelly, but he was unequal to oppose the troops of the princess, aided by the Mohammedan arms, and, after a few unsuccessful skirmishes, he fled to Sivaganga, where the ruling Setupati, Katta Deva, received him and assigned him some lands for his subsistence. The zeal which Chanda Sahib had displayed in behalf of Minakshi Amman, and the success with which it had been attended were calculated to inspire confidence as well as gratitude; and it was under these impressions that the princess granted free access to the citadel of Trichanapali to her defenders. The further precaution, however, was taken, of exacting an oath from Chanda Sahib, that he would not avail himself of this facility to the detriment of his ally. No obstacle, however, was likely to deter this ambitious prince from securing a post of such importance to his meditated schemes of aggrandisement; and, consequently, in despite of oaths and protestations, he presently seized upon the citadel of Trichanapali, and threw Minakshi Amman into prison, in which the queen, overcome by shame and despair, swallowed poison and died, thus terminating the series of the Hindú sovereigns of the Pandya kingdom. Bhangaru, with his son, the cause of these dissensions, continued some time under the protection of the Sivaganga Poligar. They and their descendants were from time to time encouraged by the Navabs of the Carnatic to expect their restoration to the possessions of their ancestors, but there is no reason to suppose such hopes were ever held out to them in the spirit of sincerity, and it is certain that they bore no fruit. The family remained some time at Vellikurchi, afterwards at Ramnad, and were thence obliged to take refuge amongst the Poligars. After the war with Tipú they returned to Vellikurchi, where they have continued to reside.

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[*] "Cette Princesse Mangamal, qui est comme depositaire de la couronne, fait élever avec un grand soin son petit fils, prince agé de quatorze ou quinze ans, à qui le royaume appartient, et confie, cependant, tout le gouvernement de l'état au Talavay, ou Prince Regent."—*Lettres Edifiantes*, x. 171. The letter is dated Avour, in the kingdom of Madura, 11 Dec. 1700.

[†] Mutiah says 1734, Orme (1, 38), 1736; but our date is confirmed by MSS. 24, which, as a family account of such recent events, seems to be the best authority.

It is unnecessary to follow further the history of Madura, as it becomes, from this period, a portion of that of the British empire in India.

LISTS OF THE PANDYAN

	No. I. Vamsavali, Vol.	No. 2. Vol.	No. 3. Madura Puran. Vol.		
1	Kulasek'hara	Kulasek'hara		Kı	
2	Malaya Dhwaja	Malaya Dhwaja		Ma.	
3	Sundara	Minakshi and Sundara	Soma Sundara	Suna	
4	Vira	Wugra	Wugra	Vugra	
5	Abhisheka	Vira	Vira	Vira	
6	Vikrama	Abhisheka	Abhisheka	Abhishe	
7	Rajasek'hara	Vikrama	Vikrama	Vikrama	
8	Anantaguna	R. Sek'hara	R. Sek'hara	R. Sek'har	
9	Kulabhara	Kulottunga	Kulottunga	Kulottunga	
10	Varaguna[2]	Anantaguna	Anantaguna	Anantaguna	
11	Raja Raja	Bhushana	Kulabhushana	Kulabhushana	
12	Raja Gambhira[5]	Rajendra	Rajendra[4]	Rajendra	
13	Chitra Virta	Sundareswara Pada Sek'- [hara	Tari Raja	Rajesa	hira
14	Chitra Guna	Varaguna	Udalura	R. Gambhira[5]	msapradi-paka[5]
15	Chitra Dhwaja	Raja Raja	Gambhira	P. Vamsadipa	uhutajit
16	Chitra Guna	Vamsa Sek'hara[3]	Vengi Adi	Purandarjit	Vamsa Pataka
17	Chitra Vikrama	Vamsa Churamani	Purandara	P. Vamsa Vataka	Sundarapada
18	Raja Martanda	Kula Sek'hara	Kumara	Sundaresa Pada Sek'hara	Varaguna
19	Raja Chudamani	Arimerddhana	Vangeya	Varaguna	Raja Raja
20	Raja Sundara	Chokanath	Eradana	Raja Raja	Chitra Ratha
21	Raja Kulottunga	Virabhadra	Sundaresa Pada Sek'hara	Suguna	Chitra Bhushana
22	Raja Sirogicha Gambhira	Vira	Varaguna	Chitra Viratha	Chitra Dhwaja
23	Raja Gambhira	Prakrama	Raja Raja	Chitra Bhushana	Chitra Verma
24	Pandya Vansa Dipa	Suravhi	Suguna	Chitra Dhwaja	Chitra Sena
25	Purandara Sundara	Kunkuma	Chitra Ratha	Chitra Verma	Chitra Vikrama
26	Pandya Vamsa Dhuran- [dara	Karpura	Chitra Bhushana	Chitra Sena	R. Martanda
27	Jannadeswara	Karunya	Chitra Dhwaja	Chitra Vikrama	R. Churamani

	No. 1. Vamsavali, Vol.	No. 2. Vol.	No. 3. Madura Purana, Vol.	No. 4. Madura Purana, Vol.	No. 5. Halasya.
28	Pandu Sek'hara	Puruskottama	Chitra Verma	Raja Martanda	R. Sardula
29	Varaguna	Chatursasana	Chitra Chera	Raja Churamani	R. Kulottama
30	Raja Sardula	Kuna, or Sundara	Chitra Vikrama	Raja Sardula	Ayodhana Pravina
31	Raja Kulottama		Raja Martanda	Raja Kulottama	Raja Kunjara
32	Ayatana Pravina		Sardula	Pravina	R. Bhayamkara
33	Raja Kunjara		Kavi Raja	K. Kunjara	Wugrasena
34	Pravira Raja Bhayancara		Kulottama	R. Bhayamkara	Mahasena
35	Varoonajana		Tunda Pravina	Wugra Sena	Satrunjaya
36	Satrunjaya		Raja Kunjara	Satrunjaya	Bhimaratha
37	Viravudanda		Raja Bhayamkara	Jayamgonda	Bhima Paracrama
38	Viraparakrama		Rudrasena	Parakrama	Pratap Martanda
39	Pratapa Martanda		Satrunjaya	Pratap Martanda	Vikrama Kanchuki
40	Vikramakaryaka		Vinatar	Vikrama Kunchuka	Yuddha Kolahala
41	Samara Sek'hara Kolatala		Viraprakrama	Samara Kolahala	Chaturi Vikrama
42	Antala Vikrama		Pratapa Martanda	Atula Vikrama	Atula Kirtti
43	Antala Kirtti		Vikramakanchuki	Atula Kirtti	Kirtti Bhushana
44	Vamsa Sek'hara[6]		Samara Kolahala	Kirtti Bhushana	Vamsa Sek'hara
45	Pratapa Surya		Yatula Vikrama	Vamsa Sek'hara	Champaka
46	Vamsatulaja		Yatula Kirtti	Vamsa Churamani, or Chanjpaka	Pratapasurya
47	Nipu Marundari		Kirtti Bhushana	Pratapa Surya	Vamsa Dhwaja
48	Chola Vamsottaraca		Vamsa Sek'hara	Vamsa Dhwaja	Vamsa Bhushana[7]
49	Kula Churamani		Vamsa Churamani	Marutakan	Loma Churamani
50	Raja Churamani		Surya Vanjival Dhwaja	Chola Vamsantaca	Kula Churamani
51	Vamsa Siromani		Marutaka	Chera Vamsantaka	Raja Churamani
52	Pandya Gambhira		Pratapa	Pandya Vamsesa	Bhupa Churamani
53	Kuvalatuja		Sovilanki	Vamsa Siromani	Pandya Kulesa
54	Vamsa Vibhushana		Suvangi Sandha	Pandyeswara	Arimerddhana
55	Kulesa		Vamsa Sek'hara II.	Kulodhwaja	Kunapandya[8] [9]
56	Chola Churamani I.		Vamsa Siromani	Vamsa Vibhushana	

57	Chola Churamani II.		Pandeswara	Chola Churamani	
58	Raja Churamani		Kulutoja	Kula Churamani	
59	Bhupa Churamani		Vamsa Bhushana	Raja Churamani	
60	Kulesa II.		Chola Churamani	Bhupa Churamani	
61	Arimarundana		Kula Churamani	Kulesa	
62	Sek'hara Nat'ha		Raja Churamani	Arimatun	
63	Vira Bhagu		Bhupa Churamani	Jagannath	
64	Vikrama Bhagu		Kulesa	Virabahu	
65	Pracrama Bhagu		Marutan	Vikramabahu	
66	Durmada		Jagannath	Pragramabahu	
67	Karunya		Virabhagu	Suradamaran	
68	Sarvasasana		Vikramabhagu	Bahubala, or Vaguvalen	
69	Sandhatum		Prakramabhagu	Kunkumatanya	
70	Nagarika		Suratamara	Karpura	
71	Chencalneelyetta		Vaguvalatu	Karunya	
72	Vetteya Vinata		Kunkumatennen	Purushottam	
73			Karpura	Satrusadhana	
74			Karunya	Kuna Pandya, or Sundara	
75			Purushottama		
76			Chitra Satana		
77			Kuna, or Sundara		

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[1] Nos. 3 and 4 should be taken from the same authority by the title, but they do not agree; the second is really from the Teruvaleyadul, which is usually called the Madura Purana.

[2] Varaguna is too early in this list by five or six at least.

[3] This list omits here between thirty and forty names, whence it is so much briefer than the rest.

[4] We have here eight kings between Rajendra and Sundarapada; the two next have but five. With this correction the three agree tolerably well as far as they go.

[5] The names of the Chitra family appear transposed in No. 1, as compared with 4 and 5, else they nearly agree.

[6] Differs from the rest in not following Vamsa Sek'hara by Champaka, whom it seems to omit altogether; else the three first lists agree tolerably well.

[7] The Halasya here omits seven or eight names.

[8] The same here omits ten or eleven names.

[9] All the lists, except the first, here close, and with the same prince, or Kuna Pandya, with whom the next series, from the same authority, seems to begin. According to the Vamsavali, the seventy-two kings here enumerated reigned in former ages.

[10] In these lists the names are often the same though differently written or expressed. Thus, Antala Kirtti (1), Yatula Kirtti (3), and Atula Kirtti (4), are the same name; and Samara Kolahala (1,3,4) means the same as Yuddha Kolahala, "the exulter in battle."

CONTINUATION OF LIST NOS.

SERIES II.

1. Soma Sundara
2. Karpura Sundara
3. Kumara Sek'hara
4. Kumara Sundara
5. Shamuk'ha Noya
6. Sasiverna
7. Paruva Mantra
8. Pararaja Sena
9. Mugaratoja
10. Satrubhayamkara
11. Satru Sama
12. Kodocola, or Kodungal

Kali, 305. Interregnum.

SERIES III.

1. Chandrakula Dipa
2. Pulikodi Paruta
3. Minkodi Paruta
4. Magaratuja
5. Martanda
6. Kuvalayana
7. Gunalaya
8. Virabagu
9. Satru Samkara
10. Vira Verma
11. Vernakulottanga
12. Raja Martanda
13. Kulaverddhana
14. Varapunyachari
15. Kulaverddhana 2d.

Invasion of Bahadur Shah.

SERIES III.

1. Somasek'hara
2. Soma Sundara
3. Raja Raja
4. ————
5. Raja Kunjara
6. Raja Sek'hara
7. Raja Verma
8. Bharata Raja
9. Kumara Sena
10. Bhímasena
11. Pralupa Raja
12. Varaguna
13. Kumara Sundara
14. Varatunga
15. Kulottunga
16. Sundara Kesara
17. Chandra Kumara

Expelled by Virasek'hara, king of Chola.

Restored by Nagama Nayak.

Here begin the Nayaks of whom we have three Lists, one of which is the present.

	Nayaks of Madura, List 1; or, the Vamsavali, Vol.	Mutiah's List.	3. From the History.
1	Viswanath.	Viswanath.	Viswanath.
2	Perya Kistnapa.	Mootoo Kistnama.	Peryakistnapa.
3	Perya Virapa.	Virapa.	Perya Virapa.
4	Viswapa.	Krishnappa.[2]	Viswapa.
5	Perya Virapa.	Mootoo Virapa.	Kumara Kistnapa.
6	Perya Kistnapa.	Terumalla.	Kasturi Rangapa.
7	Kasturi Rangapa.	Mootoo Virapa.	Mootoo Kistnapa.
8	Mootoo Kistnapa.	Chokanath.	Mootoo Virapa.
9	Mootoo Virapa.	Ranga Crishna Mootoo Virapa.	Terumalla.
10	Terumalla.	Vijayaranga Chokanath.	Mootoo Virapa.
11	Chokanath.	Minacshi Ammaul.	Chokanath.
12	Kistna Mootoo Virapa.		Kistna Mootoo Virapa.
13	Vijaya Ranga, as a minor.		Vijaya Ranga, under the regency of Mongamal.
14	Ditto, as of age.		Ditto, of age.
15	Mangamal,[1] his widow.		Minackshi Ammal, his widow.
16	Vijaya Kumar.		Vijaya Kumara.

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[1] Should be Minakshi.

[2] MUTIAH omits the three brothers of Virapa, and goes to his nephew. He omits, also, the regency of Mangamal, and the last prince. These five, added to his eleven, the three lists agree.

List of the Manuscript Translations referred to in the preceding Accounts with reference to the Pages, &c. of the Appendix to the Description of the Mackenzie Collection.

1. Vamsavali of the Chola, Chera, and Pandya Dynasties, extracted from a MS. in the possession of Kalinga Raya: and translated from the Tamil by R. CLARKE, Esq. cxxviii. vol. i. art. 1.
2. Genealogy of the Pandya Rajas from the Madura Puranam, composed by PARUNJOTHI. Translated by SRINAVASIA BRAHMAN. Ibid. i. 12.
3. Origin of Madura, with a List of the Kings (List No. 2), and the Limits of the Country. Translated from a Tamil MS. communicated by Mr. HURDIS, by SRINAVASIA. Ibid. i. 9.
4. List of the Kings of Pandya from the Teruvaleyadal, or Madura Purana. Extracted and translated by KAVELE VENKATA LAKSHMYA. MS.
5. List of the Kings of Pandya, extracted from the Halasya Mahatmya of the Skanda Purana. MS.
6. Raja Cheritee; or, Actions of the Vadaka Rajas of Tanjore, Trichanapali, and Madura. cxxviii. i. 8.

7. Madura Puranam; or, Teruvaleyadal of Paranjoti Tamburen. Translated from the Tamil by a native interpreter. Tamil MSS. or class 3, No. 33. cxciv.
8. Puranam, or Ancient History of Madura. Tamil MSS. or class 3, No. 28. Ibid.
9. An Account of the most esteemed works in the Tamil language; from a paper communicated by Mr. Cochrane.
10. Description of the Dravida country, confined almost to notices of Tamil authors. MSS. class 3. cxcvi.
11. Pandya Raja Kal; a History of the Kings of Pandya Desa. Translated from the Tamil. MSS. class 3, No. 27. cxciv.
12. Açcount of a hill called Tripurankodum and Skander Mally. MSS. class 3, No. 80. cxcvi.
13. Varaguna Cheritram; a History of Varaguna. MSS. class 3, 26. cxciv.
14. Life of Agastyer. Translated from the Tamil. MSS. class 3, 4. cxcii.
15. Life of Manukyavasager. By Vedanaik Vidhagama Siromani. class 3, No. 3. cxcii.
16. Account of the Sanketar, or Madura College. Translated from a Tamil MS. communicated by Minacshi Nayah. cxxviii. i. 13.
17. Account of Gnyana Siva-achari. By Nital Naina. Class 3, No. 9. cxciii.
18. Konga Desa Raja Cheritram; a History of the kings of Congo. cxxx. vol. iii. 6.
19. Sketch of the History of Madura. cxxxii. vol. iv. 17.
20. History of the Kings of Ramnad. Translated from the original of Soma Sundara Pilla, by Cavelly Venkall Ramaswami. cxxxii. vol. iv. 21.
21. Some account of the Setupati, or Ramnad Poligar. Translated at Simoga, by C. O. Ramaswami. Ibid vol. iv. 20.
22. Chronological and Historical Account of the Modern kings of Madura. By Mootiah. Ibid. vol. iv. 4.
23. History of the Telugu Rulers of Madura. Translated by Mr. Wheatley. Ibid. vol. iv. 5-16.
24. Account of the Rajas who held the government of the Samsthan of Madura. By Vijaya Kumara-viswanatt Bhangaru Terumala Naih Gouroo; or, the representative of the family of Terumal Naih. Class 3, 82. clxxxxvi.
25. Account of the Colars. By Minakshi Nayah of Madura. Class 3, 81. Ibid.
26. Account of Malanaudoo, and other places in the Calari country. class 3, No. 37. clxxxxiv.
27. Memoir of Tinnavelly. cxxii. vol iv. 2.
28. Raja Cheritra; or, History of the Princes of the South. Translated from the Tamil by Srinavasia.—*Journal of the Royal Asiatic Society, No.* 6, *p.* 199—242.

Supplementary Note to the Historical Sketch of the Kingdom of Pandya, by H. H. WILSON.

Shortly after the paper which the Royal Asiatic Society has thought worthy of a place in the present Number of the Journal, the Historical Sketch of the Kingdom of Pandya, was printed, I procured a copy of a valuable work recently transmitted to England from Madras, "Oriental Historical Manuscripts in the Tamil Language; translated, with Annotations, by WILLIAM TAYLOR, Missionary." The most important of the manuscripts, now first published by Mr. TAYLOR, relate to the subject of my Sketch, and constitute materials highly essential to the elucidation of Pandyan history. The chief of them, the "Madura Sthala Purana," is clearly the same as one of my authorities, the "Madura Purana;" and it seems likely that the "Pandion Chronicle," and the "History of the Karnata Governors of Madura," which are also amongst Mr. TAYLOR's translations, may be identifiable with documents in the "Mackenzie Collection," of which I have made use.

There is, accordingly, a general conformity, as close, perhaps, as could be well expected between the details of Mr. TAYLOR's authorities and those which I have given; but his conclusions, and those which I have hazarded, do not always coincide. We are most at variance with regard to the chronology of Pandyan history; Mr. TAYLOR being disposed to assign to persons and events a much higher antiquity than I have ventured to ascribe to them. I am not about to vindicate my views: they are now more fully before the public than they were in the introduction to the "Mackenzie Collection," to which Mr. TAYLOR necessarily confines his observations; and some correcter notion also may be entertained of the particular authorities which I have taken as my guides. With the present Sketch, and the benefit of Mr. TAYLOR's translations and remarks, those who are inclined to decide between us are in a condition to form a judgment for themselves.

I should not, therefore, have thought it necessary to have adverted particularly to Mr. TAYLOR's publication, had it not comprised a statement which it is necessary to correct, that a candid comparison between our deductions may be instituted. Mr. TAYLOR observes in the preface to his second volume, referring to the notice of Pândya prefixed to the Mackenzie Collection: "One position, relating to the remote origin of the Pandion kingdom, being that to which the most decided objection was felt, as opposed to several authorities, having been traced to its source, was found to have *no warrant or existence in the manuscript on which its authority was made to rest;* and there must, consequently, have been a mistake in the information on which Mr. Wilson necessarily depended, from his admitted want of acquaintance with the Tamil language." On this statement, I have, by the way, to remark, that the assumption of my depending upon "information," implying, it is to be inferred, verbal information, is gratuitous and mistaken. I trusted to translations—written translations alone; never to verbal information or interpretation. The translations were the work as frequently of European as of native scholars, as specified in the list attached to the Sketch; and in the instance of the authority on which my statement depends, was the performance of R. Clarke, Esq.

But, which is matter of more moment, Mr. Taylor's assertion, that the position is *without warrant or existence in the manuscript on which it rests,* is not only unsupported, but is even contradicted by the proof which he has himself adduced in a subsequent part of his work. The position to which he alludes is the statement, that according to some accounts, " the founder of the Pandya kingdom was one Pandya, a native of Oude;" and for this he says there is no warrant in the authority from which he supposes it to have been derived. All that he discovers in the text is, that in the manuscript "*Madura is merely said to have been founded by an agricultural Pandion from the north.*"[*] Such is his interpretation of the original and it is very possible that he may be correct; but, with such a passage actually in the original text, he is surely not justified in asserting, that there was *no* warrant nor existence whatever for the statement I had advanced, when, upon his own shewing, expressions so *very similar in their bearing do exist, and warrant, if not the precise words, yet a very similar sense.* Madura and the Pandya kingdom are essentially the same; and whether it was founded by a native of Oude, named Pandya, as I have it, or by an agricultural Pandion from the north, as Mr. Taylor states, does not appear to me to be so exceedingly different, that, where the latter occurs, it can be said that there is no warrant for the former. The difference, as far as it extends, appears to be that of translation; and the question of accuracy depends upon the relative competency of the translators. Admitting, however, that Mr. Taylor's version is correct, it does not follow that there were no traces whatever of such an interpretation as I have followed, and which, though not perhaps literally, is substantially the same with his own. Authorities may differ as to the period of this event, and its share in the establishment of the kingdom of Madura; but their weight is in favour of a colonisation from Northern India. That "Pandya of Oude," or "a northern Pandion," had any personal part in the settlement of the country, is equally improbable.

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[*] Historical Manuscripts, Appendix II. p. 39. Note.

I am too well pleased to see topics of this nature become the subject of discussion at all to take any exception to Mr. TAYLOR's arguments: our only chance of coming at the truth is by independent investigation, and a comparison of separate results. I have no purpose, therefore, to impugn his deductions; but I may be allowed to question the value of one of his authorities to which I think he ascribes more weight than it deserves. It is the manuscript in his first volume which he calls "The Supplementary Manuscript;" and which he regards as trustworthy.* I place no great reliance on any of the manuscripts which profess to record the ancient history of the Peninsula, especially in periods of remote antiquity; but there are greater sobriety, consistency, and air of likelihood in some than in others; and in those of the best description, there is a general conformity with each other, or with classical Hindu tradition, which indicates their having been compiled with some conscientiousness and care. The "Supplementtary Manuscript" possesses no such characteristics: it is exceedingly jejune and incoherent. In the first sections, the accounts which it gives of the connexion and intercourse between the Pandya princes of Madura, and the Pandavas of Hastinapura, although suggestsd by some of the adventures of Arjuna, as described in the *Mahabharata*, are wholly incompatible with the details found in that poem. The names of the first dynasty of Madura kings differ from those of every other list yet met with; and there is nothing in the meagre notices of them which gives them in a greater degree the character of realities. Twenty-four princes are enumerated as reigning from the beginning of the Kali age to the year 1183. To this dynasty succeeds VIKRAMADITYA, a prince whom all tradition places in the year of Kali 3044. Having thus so widely antedated the reign of VIKRAMADITYA, the compiler of this document is obliged to extend it in proportion; and, accordingly, it is made to continue until the year of Kali 3179, or nearly 2000 years. We then have the reign of SALIVAHANA for 990 years, and that of BHOJA for a century. In all this interval, or 3086 years, we have notice of only twenty-eight princes of Madura, and names of no more than five. Then commences a Pandya dynasty, in the appellations of the first of which, SOMA SUNDARA, and of his successors, we first meet with any agreement with other and more detailed accounts. Here then we may admit some approach to accuracy;

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* Vol. ii. p. 75.

but for all that precedes, the "Supplementary Manuscript" is worthless. The best that can be said of it is that it is a blank, as five names are a very unsatisfactory provision for the record of 3000 years. Notwithstanding, therefore, Mr. TAYLOR's favourable opinion of the "Supplementary Manuscript," I cannot think that it is to be relied on for an insight into the dark periods of Pandya antiquity; and I am satisfied, that he will find at Madras, amongst the original manuscripts of the Mackenzie Collection, many documents much more worthy of his industry and acquirements.—*Journal of the Royal Asiatic Society, No. 6, page* 387—390.

2.—*Observations of the Magnetic Dip and Intensity at Madras.*—

By T. G. TAYLOR, Esq. *H. C. Astronomer.*

Notwithstanding the value which has of late years been attached to observations of the Magnetic Dip and Intensity, I may, I believe, safely state, that the whole of British India has failed to put on record a single good set of experiments to this end. With a view to supply this deficiency for *Madras*, I have availed myself of the loan of a very excellent dipping needle, the property of Captain DRINKWATER, of His Majesty's ship *Conway;* and of two magnetic intensity needles which were brought out by the same officer, and are the property of Captain JAMES CLARKE ROSS, R. N. The dipping needle, which was constructed on purpose for the *Conway*, differs, I believe, in no respect from the ordinary construction, save that it is one of the best instruments I have met with, and, as far as I can see, absolutely faultless. The observations for Dip are as follows.

Observations for Dip made at the Madras Observatory, situated in Long. 5h. 21m. 7s. 8 *East of Greenwich, and Lat.* 13° 4′ 8″. 8 *N. on the 26th April,* 1837.

With Needle marked No. 1.

Face of Instrument East.

No.	A.	B.	No.	A.	B.
1	7° 26′	7° 28′	2	6° 16′	6° 14′
3	7 6	7 4	4	6 12	6 8
5 Inverted the axis,	7 24	7 17	6	6 4	6 8
7	7 30	7 24	8	6 16	6 22

Reversed the Poles.

No.	A.	B.	No.	A.	B.
9	7° 28′	7° 22′	10	6° 34′	6° 38′
11	7 12	7 7	12	6 16	6 21
13	7 16	7 24	14	6 24	6 28
15	7 26	7 23	91	6 27	6 33
Mean,	7° 21′ 0″	7° 18′ 37″		6° 18′ 37″	6° 21′ 30″
Needle marked No. 2.					
1	7 31	7 20	2	7 2	6 38
3	7 31	7 42	4	7 8	6 58
5 Inverted the axis,	7 42	7 25	6	6 55	6 14
7	7 50	7 30	8	6 45	6 55
Reversed the Poles.					
9	7 24	7 6	2	6 0	6 21
11	7 26	7 4	4	6 10	6 28
13	6 34	6 44	6	6 15	6 0
15	6 34	6 43	8	6 23	6 4
Mean,	7 19 0	7 11 45		6 34 45	6 34 45

And taking the general mean, we get the true Dip

with Needle	No.	1	6 49 56	No.
ditto ditto	„	2	6 55 4	
		Mean,	6 52 30	

N. B. The numbers 1, 2, 3, &c. exhibit the order in which the observations were made. During the present century, I cannot find that any observations for Dip have been made at *Madras*, but there is one result on record dated 1775, when Abercrombie found it to be 5° 15′ N.; if this result can be trusted, it would appear that the Dip is on the increase at the rate of 1′ 34″ in a year.

With regard to the needles employed for the magnetic intensity, it may be necessary to state, that they are constructed after the model of that of Professor Hansteen. The needles are cylinders, 2½ inches long and .3 inch in diameter, save that the ends are abruptly sharpened to a point; these needles are freely suspended on their centres by a few filaments of unspun silk, which are hooked on to a brass stirrup, moveable upon the needle; by which means a perfect adjustment to horizontality can be effected; the needle thus suspended is enclosed in a rectangular glass box immediately over a divided circle, from which the arc of vibration can be read off and the number of oscillations counted. The zero of measure here employed, is the time of performing 100 vibrations at a temperature of 60°, commencing with an arc of 20° and ending at from 2° to 4°.—If these measures could be observed to ultimate accuracy, it would be worth while to reduce the times of vibration under these circumstances to the times of describing an infinitely small arc, as has been done by Hansteen, and on account of buoyancy, to a vacuum; but since such is not the case, the result will be obtained to all useful accuracy by supposing the correction common to each set of observations, by which the reductions, which are rather operose, are avoided: the reduction to a temperature of 60° is effected by applying the correction, 0,00017 *t*. (where *t* represents the time of performing 100 vibrations);—a formula which is derived from experiment. The two needles used in the following observations are distinguished from one another by a sign × on one of them. This needle in *London* at a temperature of 60° performed 100 vibrations in 442,76 seconds of mean time, whereas the other needle performed 100 vibrations under the same circumstances in 461,96 seconds; the former needle is further distinguished from the latter from its having been long in use in England, and as having exhibited a remarkable degree of steadiness in its magnetism during the late magnetical experiments instituted in Ireland under the auspices of the British Association; added to which, these needles are calculated to excite a more than ordinary degree of interest from the circumstance of their having been employed by Sir John Ross in the perilous North Polar Expedition, from which he has lately so fortunately returned. The observations at *Madras* are as follows.

No. 3, Private mark ×

1837	Arc.	Ther.	Vib.	Mean Time.		Interv.	Mean Int.
				h. m. s.	s.		s.
April 30th	20° 0	88.0	1	0 43 49.4	302.2		301.57
	12 45	—	101	48 51.3			
	8 15	—	201	53 53.1	301.5		cor. for temp. 1.43
	4 0	—	301	58 54.1	301.0		
							300.14
Another set.	20 0	88.0	1	1 1 49.0	302.2		301.60
	12 45	—	101	6 51.2			
	8 15	—	201	11 52.6	301.4		cor. for temp. 1.43
	4 15	87.8	301	16 53.8	301.2		
							300.17
May 3d	20 0	87.0	1	0 45 37.7	302.5		301.97
	12 45	—	101	50 40.2			
	8 30	—	201	55 42.1	301.9		cor. for temp. 1.38
	5 0	—	301	1 0 43.6	301.5		
							300.59

No. 3, not marked.

					h.	*m.*	*s.*	*s.*	*s.*
April 26th	20° 0′	85.2	1		3	43	6.1	311.0	310.70
	12 30	——	101			48	17.1		cor. for temp. 1.31
	9 0	——	201			53	27.5	310.4	
									309.39
April 30th	20 0	87.8	1		1	25	17.3	312.1	311.50
	11 45	——	101			30	29.4		
	7 30	——	201			35	40.7	311.3	cor. for temp. 1.40
	4 0	87.3	301			40	51.8	311.1	
									310.10

or we have for the time of performing 100 vibrations at the temperature of 60° Fahrenheit at *Madras.*

Needle 3, ×	Needle 3.
s.	*s.*
300.14	309.39
.17	310.10
.59	
Mean, 300.30	Mean, 309.74

If h and h' represent the magnetic intensities at any two places, and T and T′ the times of performing 100 vibrations at those places, then we have

$$\frac{h}{h'} = \left(\frac{T'}{T}\right)^2$$

applying this, the horizontal magnetic intensity for *Madras* (that at *London* being assumed = 1.) becomes

	s.
By Needle No. 3, ×	2,1738
Ditto ditto No. 3,	2,2245

With a view to compare theory with practice, we might now compute the number of oscillations which No. 3 × ought to make at *Madras* from the observed number in *London;* thus, assuming the Dip for *London* to be 69° 10′ N. the formula becomes

$$\left\{3 + \sec.^2 (69^\circ\ 10')\right\}^{\frac{1}{2}} : \left\{3 + \sec.^2 (6^\circ\ 52'\ 30'')\right\}^{\frac{1}{2}} :: \overline{462,76}\,\rceil^2 : T^2$$

performing the computation T = 344,87 differing to the amount of 44,57 seconds from the observations. This difference between theory and observation, is but one of many instances which have from time to time occurred in the infant state of a science. Observation has led us to a theory, and then again has shewn the incompleteness of such theory. In the case of Magnetism, we have long since been prepared to expect that local causes might considerably interfere with its established laws; since one station (the island of *Teneriffe*) has already exhibited some singular anomalies, both in respect to the Dip and Intensity. Under these circumstances it is much to be wished that observations could be multiplied in various parts of India, whereby the law of variation from theory may be detected;—and how is this to be accomplished? My answer is ready:—Let any gentleman who is disposed to undertake a set of magnetic intensity experiments signify his intentions; and I shall have great pleasure in forwarding to him, free of expense, a magnetised and compared needle, provided that I am favored with a copy of the results. In anticipation that there will be several gentlemen disposed to forward this inquiry, I am now preparing several needles for use. All that is necessary is, that the person applying for a needle should be in possession of a good clock or chronometer, and has the means of ascertaining its daily rate.

Madras Observatory, 9th May, 1837.

Note.—We shall be most happy to promote the author's views by making a series of experiments with his needles in Calcutta, and then distributing them to friends in the interior. Of the dip we have a few records, (see Proc. As. Soc. for May). Major B. Blake also brought from England an adjusted intensity needle, but we have not yet been favored with his observations.—Ed.—*Journal of the Asiatic Society of Bengal, No.* 65, *May* 1837, *page* 374—377.

3.—*Report upon a Letter addressed by* M. le Baron de Humboldt *to His Royal Highness the President of the Royal Society, and communicated by His Royal Highness to the Council.*

To His Royal Highness the President and Council of the Royal Society.*

Previously to offering any opinion on the important communication on which we have been called upon to report, we feel that it will be proper to lay before the Council a full account of the communication itself. In this letter M. de Humboldt developes a plan for the observation of the Phenomena of Terrestrial Magnetism worthy of the great and philosophic mind whence it has emanated, and one from which may be anticipated the establishment of the theory of these phenomena.

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* This report is taken from the Athenæum of March 1837.

After his return from the equinoctial regions of America, M. de Humboldt, in the years 1806 and 1807, entered upon a careful and minute examination of the course of the diurnal variation of the needle. He was struck, he informs us, in verifying the ordinary regularity of the nocturnal period, with the frequency of perturbations, and, above all, of those oscillations, exceeding the divisions of his scale, which were repeated frequently at the same hours before sunrise. These eccentricities of the needle, of which a certain periodicity has been confirmed by M. Kupffer, appeared to M. de Humboldt to be the effect of a re-action from the interior towards the surface of the globe—he ventures to say of "*magnetic-storms*"—which indicated a rapid change of tension. From that time he was anxious to establish to the east and to the west of the meridian of Berlin, apparatus similar to his own, in order to obtain corresponding observations made at great distances at the same hours, but was for a long period prevented putting his plan into execution by the disturbed state of Germany and his departure for France.

The Baron de Humboldt and MM. Arago and Kupffer having, by the co-operation of many zealous observers, succeeded in establishing permanent magnetic stations extending from Paris to China, M. de Humboldt solicits, through his Royal Highness the President, the powerful influence of the Royal Society in extending the plan, by the establishment of new stations. The plan which he proposes, and which has been successfully carried into execution over a large portion of the north-eastern continent, is, that magnetical observations, whether of the direction of the horizontal and inclined needles, or for the determination of the variations of the magnetic force, should be made simultaneously at all stations, at short intervals of time, for a certain number of hours and at fixed periods of the year, precisely similar to the plan which has been recommended and adopted by Sir John Herschel, with reference to observations of the barometer and thermometer.

Referring in terms of commendation to the magnetical observations which have originated in this country, M. de Humboldt expresses his wish that such observations may, by the adoption of an uniform plan, and by connecting them with the observations now in progress on the continent of Europe and of Northern Asia, be rendered more proper for the manifestation of great physical laws. He then enters into an historical detail of the establishment of stations for magnetical observations, stating the important results obtained by MM. Arago and Kupffer by means of simultaneous observations, which appear to establish the isochronism of the perturbations of the needle at Paris and Kasan, stations separated by 47° of longitude. Under the patronage of the Governments of France, of Prussia, of Denmark, and of Russia, magnetical observatories have been established at Paris, at Berlin, in the mines of Freyberg, at Copenhagen, in Iceland, at St. Petersburgh, Kasan, Moscow, Barnoul at the foot of the Altai Chain, Nertschinck near the frontiers of China, even at Pekin, and at Nicolajeff in the Crimea.

M. de Humboldt states that the lines representing the horary variations at Berlin, Freyberg, Petersburgh, and Nicolajeff affect parallelism, notwithstanding the great separation of the stations and the influence of extraordinary perturbations; that this, however, is not invariable, since even at small distances, for example, at Berlin and in the mines of Freyberg, one of the needles may shew considerable perturbations, while the other continues that regular course which is a function of the solar time of the place.

The epochs at which it had been proposed that simultaneous observations should be made at all stations were,

20th and 21st of March,
4th and 5th of May,
21st and 22d of June,
6th and 7th of August,
23d and 24th of September,
5th and 6th of November,
21st and 22d of December,

From 4 o'clock in the morning of the first day, until midnight of the second, observing, at least hourly, night and day, at each magnetic station.

But as many observers have considered these as too near to each other, the observations most to be insisted upon are those at the times of the solstices and equinoxes.

England, from the times of Gilbert, Graham, and Halley to the present, observes M. de Humboldt, has afforded a copious collection of materials, adapted to the discovery of the physical laws which govern the changes of the variation, whether at the same place, according to the hours of the day and the seasons of the year, or at different distances from the magnetic equator, and from the lines of no variation. After adverting to the continued observations of Gilpin and of Beaufoy, omitting, however, to mention the important ones by Canton, he observes that the arctic expeditions have furnished a rich harvest of observations to Captains Sabine, Franklin, Parry, Foster, Beechey, and James Ross, and Lieutenant Hood;* and that thus physical geography is indebted to the attempts which have been made to discover the north-west passage, and also to the explorations of the icy coast of Asia, by Wrangel Lutke, and Anjou, for a considerable accession of knowledge on terrestrial magnetism and meteorology. Excited, he observes, by the great discoveries of Oersted, Arago, Ampere, Seebeck, and Faraday; MM. Hansteen, Due, and Adolphe Erman have explored, in the whole of the immense extent of Northern Asia, the course of the isoclinal, isogonal, and isodynamic curves; and M. Adolphe Erman has had the advantage during a long voyage from Kamtschatka round Cape Horn to Europe, of observing the three manifestations of terrestrial magnetism on the surface of the earth, with the same instruments, and by the same methods which he had employed from Berlin to the mouth of the Obi, and thence to the Sea of Okhotsh.

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* To this long list we may now add the name of Captain Bach; nor ought the name of Mr. Fisher to be omitted.

M. de Humboldt remarks that our epoch, marked by great discoveries in optics, electricity, and magnetism, is characterised by the possibility of connecting phenomena by the generalization of empirical laws, and by the mutual assistance rendered by sciences which had long remained isolated. Now, he observes, simple observations of horary variation or of magnetic intensity made at places far distant from each other, reveal to us what passes at great depths in the interior of our planet or in the upper regions of our atmosphere: those luminous emanations, those polar explosions which accompany the "*magnetic storm*" appear to succeed the changes which the mean or ordinary tension of terrestrial magnetism undergoes.

M. de Humboldt considers that it deeply interests the advancement of mathematical and physical sciences that, under the auspices of His Royal Highness the President, the Royal Society should exert its influence in extending the line of simultaneous observations, and in establishing permanent magnetic stations in the tropical regions on both sides of the magnetic equator, in high southern latitudes, and in Canada. He proposes this last station because the observations of horary variation in the vast extent of the United States are yet extremely rare. Those at Salem, calculated by Mr. Bowdich, and compared by Arago with the observations of Cassini, Gilpin, and Beaufoy, may, he remarks, guide the observers in Canada, in examining whether there, contrary to what takes place in Western Europe, the (diurnal?) variation does not decrease in the interval between the vernal equinox and the summer solstice.

In a memoir published five years ago, M. de Humboldt states that he has indicated as stations extremely favourable for the advancement of our knowledge, New Holland, Ceylon, the Mauritius, the Cape of Good Hope, the island of St. Helena, some point on the eastern coast of South America, and Quebec. In order, he observes, to advance rapidly the theory of the phenomena of terrestrial magnetism, or at least to establish with more precision empirical laws, we ought to extend, and at the same time to vary, the lines of corresponding observations; to distinguish, in the observations, of the horary variations, what is due to the influence of the seasons, to a clear or a cloudy atmosphere, to abundant rains, to the hour of the day or night, solar time; that is, to the influence of the sun, and what is isochronous under different meridians: we ought, in addition to these observations of the horary variation, to observe the annual course of the absolute variation of the inclination of the needle, and of the intensity of the magnetic forces, of which the increase from the magnetic equator to the poles is unequal in the American or Western, and in the Asiatic or Eastern hemispheres. All these data, the indispensable basis of a future theory, can acquire certainty and importance only by means of fixed establishments, which are permanent for a great number of years, observatories in which are repeated at settled intervals and with similar instruments, observations for the determination of numerical elements.

Travellers, remarks M. de Humboldt, who traverse a country in a single direction and at a single epoch, furnish only the first preparations for labours which ought to embrace the complete course of the lines of no variation; the progressive displacement of the nodes of the magnetic and terrestrial equators; the changes in the forms of the isogonal and isodynamic lines; and the influence which, unquestionably, the configuration and articulation of the continents exert upon the slow or rapid march of these curves. He will, he considers, be fortunate if the isolated attempts of travellers, whose cause he has to plead, have contributed to vivify a species of research which must be the work of centuries, and which requires at once the co-operation of many observers, distributed in accordance with a well-digested plan, and a direction emanating from many great scientific centres of Europe; this direction, however, not being for ever restricted by the same instructions, but varying them according to the progressive state of physical knowledge and the improvements which may have been made in instruments and the methods of observation.

In begging His Royal Highness the President to communicate this letter to the Royal Society, the Baron de Humboldt disclaims any intention of examining which are the magnetic stations that at the present time deserve the preference, and which local circumstances may admit of being established. It is sufficient that he has solicited the co-operation of the Royal Society to give new life to a useful undertaking in which he has for many years been engaged. Should the proposition meet with their concurrence, he begs that the Royal Society will enter into direct communication with the Royal Society of Göttingen, the Royal Institute of France, and the Imperial Academy of Russia, to adopt the most proper measures to combine what is proposed to be established with what already exists; and adds, that, perhaps, they would also previously concert upon the mode of publication of partial observations and of mean results.

M. de Humboldt finally refers to the labours and accurate observations of M. Gauss at the Observatory of Göttingen. The methods, however, adopted by M. Gauss being already before the Royal Society, in a memoir which has been communicated by him, renders it unnecessary here to enter into the explanation given of them by M. de Humboldt. He has referred to them in order that those members of the Royal Society who have most advanced the study of terrestrial magnetism, and who are acquainted with the localities of colonial establishments, may take into consideration, whether, in the new stations to be established, a bar of great weight furnished with a mirror should be employed, or whether Gambey's needle should be used : his wish is only to see the lines of magnetic stations extended, by whatever means the precision of the observations may be attained.

M. de Humboldt concludes by begging His Royal Highness to excuse the extent of his communication. He considered it would be advantageous to unite under a single point of view what has been done or prepared in different countries towards attaining the object of great simultaneous operations for the discovery of the laws of terrestrial magnetism.

Having very fully laid before the Council the contents of M. de Humboldt's letter, we have now to offer our opinion upon the subject it embraces. There can, we consider, be no question of the importance of the plan of observation which is here proposed for the investigation of the phenomena of terrestrial magnetism, or of the prospect which such a plan holds out of the ultimate discovery of the laws by which those phenomena are governed. Although the most striking of these phenomena have now been known for two centuries, although careful observations of them have within that period been made, and that still more care and attention have been bestowed upon those more recently discovered, yet the accessions to our knowledge, not only regarding the cause of the phenomena, but even with respect to the laws which connect them, bears a very small proportion to the mass of observations which have been made. This has arisen in a great measure, if not wholly, from the imperfection of the data from which attempts have been made to draw conclusions. Whatever theories may have been advanced in explanation of these phenomena, or attempts made to connect them by empirical laws; still, whenever comparisons have been instituted between the results of observation and such theories or laws, it has, in general, been doubtful whether the discrepancies which have been found might not as justly be attributed to errors in the observations, as to fallacies in the theory or incorrectness in the laws. Under these circumstances, the Royal Society, as a society for the promotion of natural knowledge, cannot but hail with satisfaction a proposition for carrying on observations of phenomena most interesting in their nature and most obscure in their laws, in a manner that shall not only give greater precision to the observations, but at the same time render all the results strictly comparative.

There are, however, other grounds on which such a proposition as that made by M. de Humboldt should be most cordially received by the Royal Society. This society is here called upon, as a member of a great confederation, to co-operate with several other members, already in active co-operation, for the attainment of an object which ought to be common to all; and to such a call the Royal Society can never be deaf. Those who know best what has been done by co-operation on a well-digested system, and what remains undone in many departments of science for the want of it, can best appreciate the benefits that would accrue to science by the adoption of the extensive plan of co-operation advocated by M. de Humboldt. Independently of our acquiring a knowledge of the laws which govern the phenomena here proposed to be observed, we ought to look to the effect which the adoption of such a plan may have on other branches of science. The example being thus once set of extensive co-operation in a single department of science, we may anticipate that it would be eagerly adopted in others, where, although our knowledge may be in a much more advanced state than it is regarding the phenomena of terrestrial magnetism, still much remains to be accomplished, which can scarcely be effected by any other means. We might thus hope to see the united efforts of all the scientific societies in Europe directed to the prosecution of inquiry, in each department of science, according to the plan of co-operation best adapted for its development.

We must now, after these remarks on the general bearing of M. de Humboldt's communication, go somewhat into detail on points connected with it. One point of view in which we consider the proposed plan of great importance, and to which M. de Humboldt has not expressly referred, is this:—However defective ordinary dipping instruments may be considered to be, there are few persons who have had opportunities either of making observations with the ordinary instruments for determining the variation of the needle, or of comparing those made by others by the usual methods with such instruments, who will not admit that these instruments and methods are fully as defective—possibly much more so. Thus, however we may multiply the points on the earth's surface at which such observations may be made, still great uncertainty must always rest upon such determinations of these two important elements; and in all comparisons of such observations with laws, whether empirical or deduced from theory, it will ever be doubtful whether the discordances which may be found are due to errors of observation, or are indicative of the fallacy of these laws. This source of uncertainty must, in a great measure, if not wholly, be obviated by observations made at fixed stations, with instruments of similar construction, which have been carefully compared with each other. And we have no hesitation in stating our opinion that more would be done in determining the positions of the poles of convergence and of verticity on the earth's surface, and other points most important towards the establishment of any thing like a theory of terrestrial magnetism, by simultaneous observations made at a few well chosen fixed stations, than by an almost indefinite multiplication of observations by the ordinary methods.

That a magnetic chart that should correctly exhibit the several lines of equal variation, Humboldt's "Isogonal Lines," would be of the greatest advantage to navigation, those who are best qualified to judge are most ready to admit. If to these lines were added the isoclinal lines, or lines of equal dip, the value of such a chart would, for the purposes of navigation in particular, be greatly enhanced. Whatever may be the magnitude of the influence of the iron in a ship on its compass needle, the extent of the deviation of the horizontal needle due to that influence, on any bearing of the ship's head, is a function of that bearing and of the dip of the needle at the place of observation. The extent, therefore, of the horizontal deviations, in various bearings of the ship's head, having been ascertained at any port where the dip of the needle is known, their extent at any other place, however distant, at which the dip is also known, may readily be calculated. Consequently, a chart which should correctly exhibit the isoclinal, in conjunction with the isogonal lines, would readily furnish the means of obtaining the correction to be applied to the ship's course by compass, both for the variation of the needle and for the deviation due to the ship's influence upon its compass. Whatever charts of this description may have already been constructed, and whatever materials may exist for the construction of more accurate ones, it is well known that great discrepancies exist among the data requisite for such constructions. And it appears to us that such a careful inquiry into the whole of the phenomena of terrestrial magnetism as is proposed by M. de Humboldt, is the means best adapted to insure the accuracy which would be of such inestimable advantage in this most useful application of scientific knowledge.

Although our views with regard to the stations proper to be selected for permanent magnetical observatories in general accord with those expressed by M. de Humboldt, we shall, we consider, be only conforming to his wishes, if we point out those stations which, from particular circumstances of position, appear most desirable. We consider that it would be of the greatest advantage if two or more permanent magnetical observatories were established in the high latitudes of North America, on account of the proximity of stations so situated at the northern magnetic poles of convergence and verticity, whether these poles are two different points, or one and the same; indeed, continued observations at such stations would go far to decide this question, highly important in a theoretical point of view. M. de Humboldt has mentioned Quebec as a desirable station. To this place, and also to Montreal, we conceive that an objection exists, of which possibly M. de Humboldt is not aware; many of the houses in those cities are roofed with tinned iron. This objection may not, however, exist in some of the establishments in the vicinity of either of these cities. We consider that the most advantageous positions would be, one near the most northerly establishments in Hudson's Bay, and another at or near to Fort Resolution on Great Slave Lake. As, however, observers in such positions would be placed almost beyond the pale of civilization, we fear that, for some time at least, it would be found quite impracticable to obtain regular observations at these important stations. It would likewise be desirable that there should be a station in Nova Scotia or Newfoundland; the latter would be the preferable position.

If the government of the United States were to give their cordial co-operation to M. de Humboldt's plan, by the establishment of three or more permanent magnetical observatories, in different longitudes, these, with what we may expect to be undertaken by Russia in the extreme north-west, and our own establishments, would afford the means of obtaining a mass of more interesting magnetical observations than could perhaps be derived from any other portion of the earth's surface.

M. de Humboldt mentions New Holland, Ceylon, the Mauritius, the Cape of Good Hope, St. Helena, and a point on the east coast of South America, as desirable stations, and we fully concur in the propriety of the selection. Although Van Diemen's Land, from its greater proximity to the southern magnetic pole, would be a more advantageous position for magnetical observations than Paramatta, yet the circumstance alone of there being an astronomical observatory established at Paramatta, renders it peculiarly adapted for a magnetical station. Possibly circumstances may hereafter admit of magnetical observations being also made at Hobart Town, in conformity with the general plan which may be adopted.

The Island of Ascension, from its proximity to the magnetic equator, would possess peculiar advantages for a magnetical station; but these must, in a great degree, be counterbalanced by the nature of its soil, which, being wholly volcanic, would exert an influence on the needle that would render observations made there of a doubtful character; indeed, the same objection applies to St. Helena and most of the islands of the Atlantic. Some recent observations, those of Lieut. Allen, R. N., in the expedition up the Niger, would point to the

Bight of Benin as a desirable station; but the insalubrity of the climate and other circumstances prevent our recommending its adoption.

M. de Humboldt has not referred to any station in our West Indian colonies, but we consider that circumstances point to Jamaica as a station where it is very desirable that accurate magnetical observations should be made. It is generally considered that the variation there has, for a very long period, undergone but little change; and, on this account alone, it would be very desirable to ascertain, with precision, the amount of the variation, so that hereafter the nature of the changes it may undergo may be accurately determined. Its position also, with reference to the magnetic equator, is one which would recommend it as a magnetical station.*

Although M. de Humboldt has not adverted to any other point besides Ceylon in our Indian possessions, yet no doubt he would, with us, consider it desirable that observatories should be established at different points on the continent of India; and it appears to us that Calcutta and Agra are in positions well adapted for the purpose. As, however, there is an Astronomical Observatory established at Madras, there would be greater facility in obtaining magnetical observations there than at places where no such establishment exists.† We feel assured that the East India Company, which has shewn so much zeal and liberality in the promotion of scientific inquiry, and such a desire for the advancement of scientific knowledge in the extensive possessions under its controul, would afford its powerful assistance in the establishment of observatories for the investigation and determination of the laws of phenomena intimately connected with navigation, and, consequently, with the commercial prosperity of our country.

We consider, also, that Gibraltar and some one of the Ionian Islands are very desirable stations for the establishment of permanent magnetical observatories; and, to come nearer home, that such observatories should be established in the north of Scotland and in the west of Ireland.

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* Mr. Pentland, who has been appointed Consul-General to the Republic of Bolivia, having, since the Baron de Humboldt's letter was referred to us, offered his earnest co-operation in the objects contemplated in that letter, we cannot hesitate, now that this has been communicated to us, to recommend that an offer so liberal should be made available to science. If accurate magnetical observations were made at some station on the elevated table-land of Mexico, and simultaneously at another not very distant station, nearly at the level of the sea, we consider that they would determine points relative to the influence of elevation on the diurnal variation, the dip and intensity, respecting which our information is at present, to say the least, extremely deficient.

† It will be observed by the preceding article that the zealous Astronomer of Madras has needed no other incentive to carry on these investigations than the impulse of his own ardent mind. With a munificence highly creditable to a private individual, he has offered to supply the necessary apparatus to any persons willing to undertake a series of experiments, and we hope that by this means several magnetic stations will be established in S. India. Mr. Taylor is at this time on a scientific expedition to the southward, where he has appointed to meet Mr. Caldecott, Astronomer to the new Observatory at Trevandrum, to concert with that gentleman plans for the above purpose, as well as to make magnetic experiments on the route.—*Editor Madras Journal.*

M. de Humboldt adverts to another very interesting class of magnetical observations, those in the mines of Freyberg. The mines of Cornwall from their great depth, some being 1200 feet below the level of the sea, are peculiarly well adapted for observations of this description; and, from the spirit with which philosophical inquiry has been carried on in that part of England, we do not anticipate that much difficulty would occur in the establishment of a magnetical station in one of these mines.

Having enumerated the stations which by their position appear best adapted to furnish valuable results, and having likewise pointed out the facilities which some afford for the execution of this plan of observation, immediately that the nature of the instruments to be employed has been determined upon, and that such instruments can be provided, it may be proper to advert to stations where, although the same facilities do not exist, we consider that zealous and able observers might be obtained without much difficulty. We conceive that such is the case in Newfoundland, in Canada, at Halifax, Gibraltar, in the Ionian Islands, at St. Helena, and Ceylon; and we have authority for stating that there would be no difficulty in obtaining observers, in the Mauritius, and even at the Colony on the Swan River, the latter being a most desirable station. We have not alluded to the observatory at the Cape of Good Hope; if, however, no such establishment existed, the presence of Sir John Herschel would ensure co-operation there, in any plan calculated to advance scientific knowledge. Thus, altogether, there might be formed a most extensive spread of stations, in which the principal expense would consist in the purchase of the requisite instruments; and the means of establishing stations where the same facilities do not exist might afterwards be taken into consideration. As it would be necessary that, at all the stations, observations of the barometer, thermometer, and of atmospheric phenomena, should be made simultaneously with the magnetical observations, these would altogether form a mass of valuable meteorological information which it would be scarcely possible to collect by any other means.

There is one point in M. de Humboldt's communication on which we have not yet touched: the nature of the instruments best calculated to attain the objects in view by the establishment of magnetical observatories. This is a subject on which it will be most proper to enter fully when their establishment has been determined upon; and we would recommend that then the Committee should be appointed to investigate the subject, and that this Committee should report to the Council of the Royal Society what instruments they consider it would be most advisable to adopt at all the stations, and, at the same time, give in an estimate of the expense that must be incurred for one complete set of such instruments. We may, however, in the mean time, offer a remark on one apparatus referred to by M. de Humboldt, that of M. Gauss. However well we may consider this apparatus to be adapted for the determination of the course of the regular diurnal variation, yet we apprehend that the great weight of the needles employed would prevent their recording the sudden and extraordinary changes in the direction of the magnetic forces, which are, probably, due to atmospheric changes. Another, and we conceive a very serious objection to this apparatus is, that bars of the magnitude employed must have an influence so widely extended, that there would be great risk of the interference of one of these heavy needles with the direction of another, especially in places where the horizontal directive force is greatly diminished, unless the rooms for observation were placed at inconvenient distances from each other.

By referring to M. de Humboldt's letter, it will be seen that the plan of observation so comprehensively conceived by him, has been most powerfully and liberally patronized by the Governments of France, of Prussia, of Hanover, of Denmark, and of Russia : indeed, it is quite manifest that a plan so extensive in its nature must be far beyond the means of individuals, and even of scientific societies unaided by the Governments under which they flourish. To suppose, even without the example thus held out, that the Government of this, the first maritime and commercial nation of the globe, should hesitate to patronize an undertaking, which, independently of the accessions it must bring to science, is intimately connected with navigation, would imply that our Government is not alive either to the interests or to the scientific character of the country, and would show that we had little attended to the history, even in our times, of scientific research, which has been so liberally promoted by the Government. Although the investigation of the phenomena of terrestrial magnetism was not the primary object of the expeditions which have now, almost uninterruptedly, for twenty years been fitted out by Government,—another of which, and one of the highest interest, is on the point of departure,—yet a greater accession of observations of those phenomena has been derived from these expeditions than from any other source in the same period. We therefore feel assured that, when it shall have been represented to the Government, that the plan of observation advocated by the Baron de Humboldt is eminently calculated to advance our knowledge of the laws which govern some of the most interesting phenomena in physical science; that it appears to be perhaps the only one by which we can hope ultimately to discover the cause of these phenomena; and that, from it, results highly important to navigation may be anticipated; the patronage to the undertaking which is so essential to its prosecution will be most readily accorded. We beg, therefore, most respectfully, but at the same time most earnestly, to recommend to His Royal Highness the President, and to the Council, that such a representation be made to the Government, in order that means may be ensured for the establishment, in the first instance, of magnetical observatories in those places which, from local or other causes, afford the greatest facilities for the early commencement of these observations.*—*Edinburgh New Philosophical Journal, April—July* 1837, *page* 316—330.

S. Hunter Christie.
9*th June* 1836. G. B. Airy.

4.—*Remarks on the Gamboge Tree of Ceylon, and Character of Hebradendron, a new Genus of Gutttiferæ, and that to which the Tree belongs.*—By Robert Graham, m. d., *Professor of Botany in the University of Edinburgh.*†

There are, in tropical countries, many plants which yield a yellow juice, so nearly resembling Gamboge in external characters, and it is said, even in medical properties, that they have each obtained in their respective countries, the name of Gamboge Plant. These belong to exceedingly dissimilar families, their products are never exported from the countries in which they grow, and they are therefore known not to yield any part of the *Gamboge* of commerce. It has been much doubted, however, whether this is the produce of one plant only, and those Botanists who believe that it is so, differ in opinion as to what that plant is.

Modern Naturalists think this substance is obtained from a plant belonging to the Natural Family of *Guttiferæ*, and they generally differ only in believing, either with Murray, that this plant is *Stalagmitis cambogioides*; or, with De Candolle, that it is *Garcinia Cambogia* (See *Essai sur les Proprietés Médicales des Plantes*, p. 105). Murray's opinions were founded upon certain MSS. by König, and the examination of a specimen collected by him, both of which were in the possession of Sir Joseph Banks, by whose liberality he was allowed to publish his observations, which appeared in 1789, in the ninth volume of the *Commentationes Societatis Regiæ Scientiarum Göttingensis*.

The Authors of the British and several of the Continental Pharmacopeias, have adopted Murray's opinions; but in a paper, read to the Royal Society of Edinburgh, March, 1836, I stated my belief that this acquiescence had been somewhat too hasty; and my belief was founded on the examination of flowering specimens and drawings, with observations made in Ceylon, most obligingly communicated to me by Mrs. Col. Walker, and on the examination of a specimen in fruit transmitted by Mr. Blair to the late Dr. Duncan, now in the Materia Medica Museum of this University.

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* We have not introduced the Baron de Humboldt's letter to the President of the Royal Society, because our space will not admit of it; moreover, the Report of M. M. Christie and Airy, together with their own admirable observations, gives a conveniently condensed abstract of it, which renders such a step unnecessary.—*Editor Madras Journal.*

† It will be observed by our 14th Number, p. 300, that Dr. Wight has been simultaneously occupied in the examination of this subject, and, in a paper published anteriorly to Dr. Graham's, has proposed a name for the plant yielding the Gamboge more unexceptionable, in our opinion, than *Hebradendron*.—*Editor Madras Journal.*

All the *Gamboge* of *Commerce* is exported, as it appears, from Singapore, and believed to be obtained from Siam. The observations of König were made in Ceylon, and during a short stay in Siam,—but chiefly at the former place, where his specimens must have been gathered; for Murray informs us that all his information in Siam was derived from a Roman Catholic Priest, who gave him a very imperfect description of the tree, and that König himself had never seen it alive, and had not even an opportunity of verifying the meagre description *(descriptio proletaria)* of his informant by procuring a single twig. Out of these materials, however,—viz., the said description, the observations of König made in Ceylon, and portions of a specimen in the Banksian Herbarium, transmitted from thence by König,—does Murray construct the character of his genus *Stalagmitis*, and define his species *cambogioides*. Murray's description is, in some respects, wholly at variance with the only tree which, in Ceylon, yields a matter having all the properties, and answering all the purposes of *Gamboge*; yet in Ceylon, as I have said (I presume from Murray's testimony), König's specimens must have been obtained. Indeed we have another authority than that of Murray for this belief; König himself gives his plant the Singhalese names of *Ghokkatu*, *Gokathu*, or *Ghotathu*, and *Kanna Ghoraka*, yet there is nothing so easy as to show that the description of *Stalagmitis* by Murray is inapplicable to this plant.*

The specimens which I possess of the Ceylon tree and its product, and the characteristic drawings with which these are accompanied, together with the information I have obtained regarding it, I owe entirely to the great kindness of my most intelligent correspondent, Mrs. Col. Walker; who, conjointly with her husband, is profiting with equal zeal, judgment, and success, by the ample opportunities which they enjoy of cultivating an acquaintance with the Botany of that rich and interesting island, Ceylon. It will give value and authority to these observations, if I make some extracts from Mrs. Walker's letters, in which the tree, in conformity with previously received opinion, is called *Stalagmitis cambogioides*,—and I shall afterwards state what the tree really is.

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* These observations regarding the origin of König's specimens, were written before I had the direct testimony of Mr. Brown. In a letter, dated Aug. 3, 1836, which I shall presently quote again, he writes, "*Stalagmitis* of Murray, as you well know, is entirely formed from König's MSS., and a portion of his specimens or rather of one of his specimens, and these specimens, as well as the descriptions, belong to the plant, of Ceylon."

In her first letter, dated Colombo, 1st July, 1833, Mrs. Walker says, "I have set about the *Stalagmitis cambogioides*, which is at present in fruit, and have drawn a branch, with a section of the fruit. I have likewise procured some Gamboge from the tree; it is brilliant and excellent. It is obtained from two other trees here, the *Garcinia Cambogia* and an unknown tree, which Col. Walker thinks is a *Garcinia* likewise. Specimens from both I shall send you, and drawings* also. The fruit of *G. Cambogia* is much used by the natives in their curries; and I am told, when quite ripe, is a very fine fruit, as large as the *Mangosteen*, which it resembles in form. The native name is *Goraka*. The fruit of *Stalagmitis cambogioides* is much smaller, very sweet when ripe, and by no means disagreeable in flavour. It is called here *Kana* (or eatable) *Goraka*. I have not yet ascertained all the uses made here of Gamboge, but it is certainly employed as a pigment by the native artists. Our servants say it is also used by native practitioners in medicine, and sometimes as a plaster, when first taken from the tree. It does not appear to exude like a gum, but on an incision being made, it issues freely through the pores of the bark, as I saw yesterday on cutting both the *Stalagmitis cambogioides* and *Garcinia Cambogia*. I have been trying it as a paint to-day, and find it as good as any I ever used.† We have no intercourse whatever with Siam, and I fear I can procure you no information from thence. I should think, from the specimen I have already got, that the matter which exudes from the *Stalagmitis cambogioides*, when an incision is made in the bark, is undoubtedly pure Gamboge. I have used it in colouring some of my flowers: it is quite liquid when it issues from the pores of the tree, but soon hardens when exposed to the air. I have not tried the stuff from the *Garcinias*, but it tastes and smells exactly like Gamboge."

Mrs. Walker's next letter is dated Aug. 20, 1834:—she says, "Your letter of February 1833, in which you first mention the subject of Gamboge, I received in June of the same year, and immediately inquired about the plant, which I found to be in fruit. In that state I drew it to the best of my abilities, but put off sending it to you till I had an opportunity of forwarding also, a representation of the flower, which, as many plants here blossom twice in the year, I hoped I might not have long to wait for. However, I was mistaken in this; the tree did not blossom till March, 1834. I drew it then, but have not since been able to send it home, not a single ship having sailed from hence to England during that long interval; and, I fear, after all, that you will consider my drawing incomplete, as it is only the barren flower I have had the means of representing. So at least it seems to me, and I got quantities of the blossoms, and examined a great number, and found them all the same. I shall send you specimens for your own examination; but I am sorry to say, they look very shabby and poor. The flower, however, in its best state, is insignificant, and poor-looking. The tree does not grow abundantly nor luxuriantly in the immediate neighbourhood of Colombo. Last January we took a little excursion, and got quite into a forest of *Stalagmitis cambogioides*, and perceiving all the trees had their bark cut off in various places, I concluded the people in the neighbourhood must be in the habit of collecting the gum, and determined to get all the information I could on the subject, for your edification. From a very intelligent native practitioner in medicine, I gained the following:—He told us that Gamboge from the *Stalagmitis*, called by the natives *Gokatu*, or *Kana Goraka*, is generally used by them, both as a pigment and medicinally. For the former purpose it is ground very fine with lime-juice,* and mixed with a pretty strong solution of the gum of the *Wood Apple* (*Feronia Elephantum*), called in Singhalese, *Diwul*. With the addition of a little Chunam, or Lime, they make a deep orange-colour, both tints being much used in the decoration of their temples, and Boodh himself is always represented in yellow garments. Yellow is indeed the sacred colour, the priests being invariably arrayed in yellow robes.

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* I have received excellent drawings of *Garcinia Cambogia* (Willd.), of *Garcinia Cambogia*, β. (Moon), and of the unknown plant alluded to, together with specimens of the two first, but none of the last, which seems a species of *Carallia*. R. G.

† In a note on the back of the drawing, Mrs. Walker says, "It issues from an incision in a thickish liquid state, and of a light yellow colour, but soon hardens when exposed to the air, and becomes of much deeper hue, and is perfectly fit for use in water-colour drawings, as much so as any I ever purchased, which was prepared and sold in the London colour-shops."

"As a medicine, the Gamboge is ground to a fine powder, and being mixed with the juice expressed from the leaves of the Tamarind tree, is taken with a little water. This is the most common mode of administering it as an aperient; but when mixed with other ingredients it is considered by native practitioners to be beneficial in many diseases. It is collected by cutting pieces of the bark completely off, about the size of the palm of the hand, early in the morning. The Gamboge oozes out from the pores of the bark, in a semi-liquid state, but soon thickens, and is scraped off by the collectors next morning without injury to the tree, the wounds in the bark readily healing and becoming fit to undergo the operation again. The learned doctor, who gave us this information, presented us with a large pot or jar of Gamboge, and promised to send us more, which promise he faithfully kept, and I shall forward specimens to you of his present by the first opportunity. The *Garcinia Cambogia*, of which I transmit you a representation, is one of the most common trees in this neighbourhood, attaining a large size, and is very handsome, with remarkably thick and dark foliage. A quantity of resinous juice proceeds from its bark, in the same manner that Gamboge does from the *Stalagmitis*; but it never seems to harden thoroughly, and no use is made of it by the natives. The outer husk of the fruit, however, is a favourite ingredient in their curries. They prepare it by taking out the pulp and seeds, breaking it to pieces, and putting it in a heap, which is covered for two or three days, till it becomes soft. It is then smoked by burning cocoa-nut shells below the grating on which it is spread. This operation is continued for many days, when it is tied up tight in a bag, and kept for use by being hung, I cannot say in the chimney, for chimneys they have none,—but where it is under the influence of the smoke from their fires when cooking. They also use it in pickling or preserving, along with salt, a kind of small fish, which cured in this way will keep for six or seven months. The flower of No. 2, which I suppose is also a *Garcinia*, differs much from No. 1, but the fruit appears almost the same, and is used by the natives in the same way. They are indiscriminately called Goraka by the Singhalese, but are distinguished by their colour." *

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* In a recent letter to Dr. Christison, Mrs. Walker says that she finds this to be a mistake. As a yellow pigment, the juice is used without any preparation; the addition of lime juice injuring the colour—an observation which Dr. C. has confirmed by experiment.

In a subsequent letter, dated January 2, 1835, Mrs. Walker says, "I am convinced *Stalagmitis* produces true *Gamboge*. Dr. Pitcairn is of the same opinion, and desires me to tell you that he has administered it in the same way as it is used medicinally at home, and found its effects precisely the same."

I shall now state what the plant seems to be which is called by Mrs. Walker *Stalagmitis cambogioides*, and what are my reasons for forming the opinion which I entertain.

Linnæus, in his *Flora Zeylanica*, No. 195, under the name *Cambogia*, quotes as a synonym, "Carcapuli Acostæ, fructu malo aureo simili," of Plukenett's *Almagestum Botanicum*; which, if it be the same as the twig figured by Plukenett in his *Phytographia*, *t.* 147, *fig*. 3, seems to me to be *Xanthochymus ovalifolius*.

In the same work, Linnæus also quotes, as a synonym of his Cambogia, the "Arbor Indica, quæ gummi guttam fundit, fructu acido sulcato mali magnitudine" of Commelyn's *Flora Malabarica*, which is certainly "Coddam-pulli" of Rheede in *Hortus Malabaricus*, *Mangostana Cam-*

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* No. 1. I believe this to be *Garcinia Cambogia*, Willd., which is *G. affinis* of Wight and Arnott, certainly not of Wallich. No. 2 is probably a *var.* of *G. Kydia* of Roxb., perhaps his *G. purpurea*; but as Roxb. gives no description of *G. purpurea*, the point cannot be determined. It is, no doubt, the *G. Cambogia* β., or Red Garcinia, of Moon's Catalogue. R. G.

bogia of Gærtner, *Garcinia Cambogia* of Desrousseaux and of De Candolle.

Linnæus lastly in the same work, cites as a synonym for his *Cambogia* "Carcapuli Acostæ, arbor Indica gummi guttam fundens, fructu dulci, rotundo, cerasi magnitudine," of Burmann's *Thesaurus Zeylanicus*, which, I think, is certainly *Mangostana Morella* of Gærtner *Garcinia Morella* of Desrousseaux and De Candolle, and, as certainly, *Stalagmitis cambogioides* of Moon's Catalogue of Ceylon Plants, and of Mrs. Walker; but by no means the "*Carcapuli*" of Acosta in his *Tractado de lâs Drogas*, p. 356; which seems to be *Carcapuli Acostæ* of *Pluk. Alm.* 81, *Garcinia Cambogia* of Desrousseaux.

It would probably be thought tedious and useless to follow the contradictions of authors regarding the identity of these plants, and that which yields Gamboge, from 1748, when the *Flora Zeylanica* was published, to the present day. I shall therefore pass them all over, until I come to the latest. In the excellent "*Prodromus Floræ Peninsulæ Indiæ Orientalis*," published by my friends, Dr. Wight and Mr. Arnott, in 1834, it is stated that *Stalagmitis cambogioides* (of Murray) is a species of Garcinia, and perhaps identical with *Garcinia Cochinchinensis* of Choisy, *Oxycarpus Cochinchinensis* of Loureiro. The whole of the account given by Murray of his *Stalagmitis* appeared to me, at the time I communicated my observations to the Royal Society, so enigmatical that I felt unable to form an opinion as to what it is; but I expressed my fears that the statement of Wight and Arnott only threw out another temptation to blunder; for Murray says, that in his plant, the flowers are arranged on a common footstalk, generally more than an inch long, in the axils of the leaves, jointed and bearing the pedicels, which are twice the length of the flowers themselves, in verticels at the joints, and that the fruit is globular, white, slightly reddened on one side, and sometimes twice the size of a large cherry; while Loureiro and Choisy describe their plant as having clustered nearly sessile flowers, with a pear-shaped reddish-yellow fruit, two inches in diameter. Wight and Arnott further say, that the *Stalagmitis cambogioides* of Moon is the *Xanthochymus ovalifolius* of Roxburgh; but Roxburgh describes his plant as having a three-celled ovary, a fruit as large as a small apple, while the genus is partly characterized by the flowers having five petals, and by the presence of five large truncated glands, alternating with the fasciculi of stamens. On the other hand, Mrs. Walker's drawings, and specimens of the fruit sent by Mr. Blair to Dr. Duncan, show that this, like the fruit of *Garcinia Morella*, is four-celled, and not larger than a cherry; and in the specimens which Mrs. Walker has sent to me, I never find more than four petals, and cannot see a trace of these glands. I only mention these circumstances now, to show the inextricable confusion in which the subject lay, and in which it would have remained, had it not been for Mrs. Walker and the kindness with which Mr. Brown attended to my request that he would examine the specimens of König in the Banksian Herbarium. This examination has reconciled most of the contradictions of authors in a way which could hardly have been anticipated; the authoritative specimen of König is a compound, and consists of the flowers of *Xanthochymus ovalifolius*, with what seems the branch, leaves, and fruit of the plant which in Ceylon yields Gamboge. I give authority to this statement by quoting the letter of Mr. Brown. "The plant sent pasted by König to Sir Joseph Banks, as one specimen, I have ascertained to be made up of two plants, and very probably of two genera. The union was concealed by sealing wax. The portion in flower, and which agrees in structure with Murray's account, is, I have no doubt, the *Xanthochymus ovalifolius* of Roxburgh. *Stalagmitis* and *Xanthochymus* are therefore one genus, as Cambessèdes has already observed, giving the preference to the earlier name of Murray. This, however, forms but a small part of the whole specimen, the larger portion being, I am inclined to think, the same with your plant, of which I have seen, and I believe still possess, the specimen you sent to Don.[*] The structure, however, of this greater portion cannot be ascertained from the few very young flower-buds belonging to it. It approaches also very closely, in its leaves especially, to that specimen in Hermann's Herbarium, which may be considered as the type of Linnæus' *Cambogia Gutta*. A loose fruit, pasted on the sheet with König's plant, probably belongs to the larger portion, and resembles Gærtner's *Morella*."

It appears then that the generic name of *Xanthochymus* must be dropped, and that the species which belonged to this genus must receive the appellation of *Stalagmitis*. It seems too, that the generic character of *Stalagmitis* by Murray, so far as regards the flower and inflorescence, was not taken from the plant he meant to describe, but from the flowers of *Xanthochymus* (*Stalagmitis*) *ovalifolius*, which König had inadvertently fastened to it; and lastly, that it is not known that any specimens of the flowers of the plant which Murray meant to describe, at least not any sufficiently perfect for examination, had been received in Europe, till those arrived which I owe to Mrs. Walker. The examination of these, proves that the plant is no *Stalagmitis*. It differs wholly in the number of the parts of the flower and cells of the fruit, in the structure of the calyx, corolla, and stamens; in the absence of intervening glands between the stamens, in the structure of the leaves, in the appearance of the fruit, and in the structure of the persistent stigma. While I remain quite certain that this plant is the *Garcinia Morella* of Gærtner, an opinion which was first formed from an inspection of the specimen in fruit from Mr. Blair, the examination of Mrs. Walker's specimens has induced me to remove the plant from the genus *Garcinia*. The structure of the stamens is quite peculiar, and quite unlike that of any species of *Garcinia* with which I am acquainted, in which the free portion of the filament is thread-like, and the anther bilocular, opening longitudinally. In Mrs. Walker's flowers, on the contrary, the free part of the stamens is thick and clavate, and the anthers open by the complete circumcision of a singular umbilicate, flat, and terminal lid, the elliptical pollen-granules being immersed in cellular substance.

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[*] One of those received from Mrs. Walker.

For these reasons, I cannot hesitate in believing that the Gamboge plant of Ceylon belongs to a nondescript genus, characterized especially by the stamens, which have suggested the name of *Hebradendron.* Having communicated this opinion to Mr. Brown, he replied, "In your plant, the structure of the anther is indeed very remarkable, and might well induce you to consider it as forming a distinct genus; but it is right to add, that approaches to this structure, and which serve to explain its analogy with the ordinary structure of the family, exist in *Garcinia,* with which I suppose your plant would agree in its female flower, as well as in fruit."

As I have never seen the female flower, nor any drawing of it, I cannot add to the probability which is given to this conjecture by Mr. Brown having formed it, except by stating, that there are within the persistent calyces of the fruit, abortive filiform stamens, very much resembling those which are found similarly attached to the fruit of *Garcinia.*

The resemblance to the Ceylon plant, of the inflorescence and form of the flower-bud, of *Garcinia elliptica (Wallich's List, No.* 4869), led me to examine its structure in connexion with this subject, and I found it also to have male blossoms, with stamens precisely similar. Sir W. J. Hooker was also struck with the resemblance, and obligingly forwarded to me his specimen for examination. His flowers were further advanced than mine, and on my requesting him to steep one, he sent me drawings which it is impossible to distinguish from those taken from the Ceylon plant. It is unfortunate that we do not know the female flowers in either species; and yet, if I do not misunderstand Mrs. Walker, or if she is not mistaken, which is less likely, the Ceylon plant is monœcious.

It is very certain that the tree of Ceylon yields a *Gamboge,* fit for all the purposes of that from Siam, and equal to it in quality, though from the process by which it is prepared for the market not being so perfect, its appearance is less attractive, and the price must be depreciated till that process is improved. At present, however, we have no direct testimony as to the tree which affords the *Gamboge* of Siam. Its being the same with that which in Ceylon yields this substance may be doubted. It is perhaps, and more probably, a nearly allied species of the same genus; this affinity appearing from the experiments of Dr. Christison, shewing all but an identity of chemical composition in the product, and from their medicinal effects being precisely the same, as has been proved in Ceylon, and in this country, both by Dr. Christison and myself.

It seems probable, from some parts of the description in the *Flora Indica*, and the quality of the Gamboge yielded by it, that *Garcinia pictoria*, Roxb., may prove to be another species of this genus; but in this conjecture I must be wrong, if Buchanan is correct in considering this the same as *Oxycarpus Indica (Encycl. Method. Suppl.* 4. 257). I think, however, Buchanan is mistaken, for he deems it, at the same time, synonymous with *Garcinia Indica* of Choisy, and with "Arbor Indica Gummi guttam fundens," &c. of Burmann; while, in fact, the specimen in his Herbarium, from which he makes these references (No. 1118) is *Garcinia cornea.* The locality where *Garcinia pictoria* is found (Wynaad) being limited, and the tree having been, formerly at least, well known at Tellicherry, it is probable that specimens may be procured to ascertain the fact.

HEBRADENDRON.[*] *Graham.*

Nat. Ord. GUTTIFERÆ.—Class and Ord. MONÆCIA (or Diœcia ?) MONADELPHIA.

GEN. CHAR. HEBRADENDRON. *Flores* diclines. *Masc. Calyx* membranaceus 4-sepalus, persistens. *Corolla* 4-petala. *Stamina* monadelpha, columella 4-gona, antheræ terminales, operculo umbilicato circumscisso. *Fœm.* incognitus. *Bacca* multi (4) locularis, loculis monospermis, staminibus quibusdam abortivis liberis basi circumdata, stigmate sessile lobato muricato coronata. *Cotyledones* crassæ, coadunatæ. *Radicula* centralis, filiformis.—Arbores *foliis integris.*

1. Hebradendron *cambogioides;* floribus masculis axillaribus, fasciculatis; sepalis junioribus subæqualibus; foliis obovato-ellipticis, abrupte subacuminatis.

Synonyms.

Carcapuli Linscot, *Herman. Mus. Zeylan. p.* 26. *Ibid. in Rheed. Hort. Malab.* 1. 42. *in nota.*—Ray, *Hist. Plant.* 2. 1661. *Samuel Dale Pharmacop.* 327.

Arbor Cambodiensis Guttam Gambi fundens. *Pluk. Alm.* 41. *Ibid. Mantissa* 20.

Arbor Indica Gummi guttam fundens, fructu dulci rotundo, Cerasi magnitudine, Carcapuli Acostæ. *J. Burmann. Thesaurus Zeylan.* 27.

Cambogia Gutta. *Linn. Fl. Zeylan.* 87. *(excl. omn. syn. præter. Dale, Ray, Burm. Herm.) N. L. Burmann. Fl. Indic.* 119. *(excl. Syn. Pluk. et Rheed).*

Mangostana Morella. *Gært. Fruct.* 2. *p.* 106. *t.* 105.

Garcinia Morella. *Desrousseaux in Lam. Encycl. Method.* 3. 701. *Pers. Synops.* 2. 3. *Choisy in De Cand. Prodr.* 1. 561.

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[*] From ἐβραιος δενδρον, in allusion to the peculiar dehiscence of the anthers.

Stalagmitis Cambogioides. *Moon's Cat. of Plants in Ceylon, Part I. p.* 73.

Descr. A *Tree* of moderate size. *Leaves* opposite, petiolate, obovato-elliptical, abruptly subacuminate, coriaceous, smooth, shining, dark-green above, paler below, veins in the recent state inconspicuous, especially above; in the dried state, distinct on both sides. *Flowers* unisexual, monœcious, (or diœcious?). *Male* small (eight to nine lines across), clustered in the axils of the *Petioles*, on short single-flowered peduncles. *Sepals* four, subequal, imbricated, concave, membranous, veined, the outer subentire, and somewhat coriaceous in the bud, the inner sparingly denticulato-ciliate, yellow on the inside, yellowish-white on the outside. *Petals* four, spathulato-elliptical, coriaceous, crenulate, longer than the calyx, yellowish-white, red on the inside near the base, deciduous. *Stamens* monadelphous; column four-sided; *Anthers* in a roundish capitulum, terminal upon a short clavate free portion of the *filament*, opening by the circumcision of a flat umbilicate lid; *pollen* yellow, granules elliptical. No trace of a *Germen*. *Female Flower* unknown. *Berry* about the size of a Cherry, round, with a firm reddish-brown external coat, and sweet pulp, four-locular, surrounded at the base by the persisting *calyx* and a few free abortive *stamens*, crowned with the four-lobed tubercled sessile *Stigma;* loculament single-seeded. *Seeds* large in relation to the berry, reniform-elliptical, compressed laterally, integuments yellowish-brown, easily separable into two layers; *Cotyledons* thick, cohering into an uniform cellular mass; *radicle* central, filiform, slightly curved.

Native of Ceylon.—For the colour and several other parts of the description, I am indebted to Mrs. Walker.

2. Hebradendron *ellipticum;* floribus masculis axillaribus, fasciculatis; sepalis exterioribus junioribus minoribus; foliis lanceolato-ellipticis, apice sensim attenuatis.

Synonym.

Garcinia elliptica. *Wall. List of Indian Plants, No.* 4869 (*not Choisy in De Cand. Prodr.* I. 561).

I know nothing of this species, but from the specimens sent by Dr. Wallich to Sir W. J. Hooker's Herbarium and to my own. The specific character which I have drawn up, may therefore seem insufficient to distinguish it; and I might perhaps, have considered it only a *variety* of *H. Cambogioides*, but for the complete identity of form in the specimens from Dr. Wallich; their *prima-facie* difference from any of those received from Mrs. Walker; their considerably larger dissimilar leaves, and also their very different geographical position, less unlikely to possess natives of Siam than of Ceylon, Dr. Wallich's plants were obtained in Silhet.—*Companion to the Botanical Magazine, No.* 19, *page* 193—200.

LITERARY AND SCIENTIFIC INTELLIGENCE.

A correspondent at Ganjam has favoured us with the following notice :—

GANJAM, *30th June*, 1837.

A smart shock of an earthquake was felt here last night about ten o'clock. The ground was violently agitated, and the houses in the town shook so much that the inhabitants ran out into the streets in fright. I have not heard that any buildings actually fell. I send you this notice merely that you may compare notes with other accounts you will doubtless receive from other parts of the country, as so severe a shaking must have been felt a considerable distance.

With reference to the account of the operations at Pamban (see p. 111), we copy the subjoined extract of a letter from Lieut. LAKE, of the Engineers, from the Madras *Herald*:—

" An English schooner yesterday (18th July) laden with iron and going to Negapatam, passed through the channel with a tolerable fresh breeze, and the main sail and jib set, in lieu of anchoring to the south and warping through as is customary. She did it at our suggestion as I was anxious to prove to them how easily they *might* do it—the Pilots were much against it. She did not take out a single pound of her cargo, and she drew close upon seven feet of water, and passed through an hour and a half before the tide had ceased flowing. A dhoney, drawing six feet, immediately followed her example, both with perfect safety, and never touched. This is I understand the first instance of an English rigged vessel passing through the channel with her sails set—certainly none have done so since I have been here—the depth is therefore considerably above the seven feet. Up to this date from the 1st, 500 tons of stone have been removed from the main channel."

An obliging correspondent at Malacca has forwarded to us a drawing of the Tapir (sent to the Asiatic Society of Bengal, by Lieut. MACKENZIE, of the 48th Regt. M. N. I.) which gives a very correct delineation of that rare and singular animal. It is a female, of enormous bulk, upwards of four feet high. Several friends who saw the animal at Malacca say, that this drawing gives its contour and general characteristics most faithfully. This being the case, it follows that all the published engravings which we have seen require correction. The figure in the English edition of Cuvier, represents a comparatively light and agile animal, quite devoid of the heavy look, cumbrous figure and rugous skin, delineated in our drawing, and which all our informants say are peculiar characters of the Tapir. The eye is small and dull, the legs massy, the general appearance of the animal clumsy and unwieldy, and the skin about the throat and extremities in folds like that of the rhinoceros—in fact the creature seems to be a link in the pachydermata, between the rhinoceros and the hog.

It is in contemplation to publish an English and Hindustani Dictionary, if sufficient Subscribers can be found to cover the expenses. The work is by a Member of the Madras Civil Service: it is already in manuscript, and, in our next, we hope to be able to give further particulars, and to publish a specimen of the production.

We have received the following communication, and gladly afford it a place in this Journal, with a view to promote enquiry and elicit information on the very curious subject of Mr. Whewell's enquiries, which are exciting so much interest among scientific men in Europe :—

Dear Sir,—The Asiatic Society having been requested by its Patron the Rt. Hon'ble the Governor General, to draw the attention of those of its Members who may be resident within convenient distance from the Sea Coast, to the desiderata published by the Rev. Professor Whewell, in 1833, regarding the phenomena of the Tides, I have been directed to prepare the accompanying copy of the Professor's suggestions for circulation, and to address them to those of the Society's associates and correspondents, whose zeal in the cause of science furnishes an assurance that they will cordially co-operate in obtaining the information required.

As regards the tides of the Indian Ocean, the principal points to be ascertained are,—the exact times of the arrival of the tidal wave (i. e. the times of high and low water) at several stations on the East and West Coasts of the Bay of Bengal, simultaneously observed for one or more lunations—or if practicable for a whole year. If to this information can be added the *tide-lift*, or difference in perpendicular height between high and low water, obtained by means of a pier or a post set up for the purpose, the utility of the register will be much enhanced. The direction and velocity of local currents caused by the tide, with note of the prevailing winds and their action on the tides or the currents, will also be valuable additions.

It is particularly desirable to note the difference of the tide-lift in the two tides which occur within the same 24 hours, to serve as data for calculating what has been called the diurnal irregularity, a phenomenon now discovered to be dependent on the declination of the moon north or south of the equator, but which has not hitherto been regarded in any of the published Tables of the daily tides, although the differences thus caused are of great magnitude, and are of material importance in the navigation of rivers and shallow seas.

In noting the time, it should be stated whether apparent, or true time, is intended; and if the time of the moon's passage over the meridian is mentioned, it will be a means of checking the rate of the clock.

Those gentlemen who may not be able to take observations themselves, from the situation of their houses or other causes, may frequently be able to instruct and employ a Classy or servant to note daily the most simple and essential points, the time and height of high water.

By way of ensuring results as comparable as possible, the months of July, October, January and April are selected, commencing with the new moon first occurring in each:—but it is by no means intended to restrict observations to these months, as any full period of a lunation will give information whence, what is called, "the tidal establishment" of a port may be deduced.

The Society has no intention of imposing a pecuniary tax on those who are willing to lend their aid in the prosecution of these enquiries; I am therefore directed to request that you will oblige me with a note of any trifling expense to which they may lead, relying, with confidence, on your judgment and discretion to effect the object as cheaply as possible.

I have the pleasure to remain,
Dear Sir,
Yours very faithfully,
J. PRINSEP,
Secretary.

ASIATIC SOCIETY'S APARTMENTS, *7th June*, 1837.

Suggestions for Persons who have opportunities to make or collect Observations of the Tides.

" It was shewn by Newton, nearly 150 years ago, that the fact of the Tides and several of their circumstances, resulted from the law of the Universal Gravitation of matter. But in this interval of time scarcely any thing has been done which might enable us to combine into a general view the phenomena of the Tides as they take place in all the different parts of the world; and a very few places have good and continued observations been made and published. It is conceived that by collecting such observations as have been made, or may easily be made, the connexion and relation of the Tides of all the parts of the Ocean may be in a short time clearly made out: and that persons may be induced to make such careful observations as may serve to be compared with the theory. In this hope the present paper is circulated.

The most useful Observations with reference to our general knowledge of the Tides are the following, beginning with those which are most easily made.

1. The Observation of the Time of High water at a known place, on any day, and especially at new and full moon.

2. The Observation of the Time of High water on several days in succession at the same place.

3. The Observation of the Height of several successive Tides at the same place.

4. Observations of the comparative Time of High water on the same day at different places in the same seas.

1. An Observation of the TIME of High water at a given place on *any* known day may be useful.

If the Time of the *Moon's southing* on the same day be noted, this will facilitate the use of the observation, and will furnish an additional evidence of the correctness of the date.

The Time of High water on the days of *New and Full Moon* is more particularly useful than on other days.

Observations of the Time of High water may be made with sufficient accuracy without a tide-post. A place ought to be selected where the water is tolerably smooth.

2. If there be opportunity at any place, it is desirable to observe the Time of High water *every day for a fortnight.*

If it be ascertained that the two Tides on the same day occur at regular intervals, *one* of them only need be observed.

But there are often irregularities in the relative Times of the morning and evening Tide; and these irregularities are different for different ages of the moon. In this case *both daily Tides* should be observed.

3. A single observation of the Height of the Tide is not of much value. But a *Series* of Heights *for a fortnight* is valuable, especially if accompanied with observations of the Times.

The morning and evening Tide are often unequal, and this inequality sometimes varies considerably from one fortnight to another.

In Observations of the Height of the Tide, the *difference of High and Low water* ought to be taken.

The channel of a river is *not* a good situation for such Observations.

4. The usefulness of Tide Observations will be greatly increased if those made at places in the same seas can be compared so as to shew the RATE *at which the Tide wave* TRAVELS :

For example, the time which it employs in passing along a certain line of coast, or across a sea, or round an island, or up a bay.

N. B.—The Tide wave is the elevation of the waters by which High water is produced in many places at once. It is not observed as a visible wave, but is found by drawing a line upon the globe through all the places at which it is high water at a certain moment. The rate and direction of its travelling are known by comparing the position of such lines at successive times.

N. B.—The Rate *at which the Tide wave* Travels is quite distinct from the rate at which the stream of ebb or flow *runs*.

N. B.—Also the Direction in which the Tide wave travels is quite distinct from the direction in which the Tide *ebbs or flows*.

The most proper Observations for determining the rate and course of the Tide wave are those of the Time of High water *on the same day at different points* (not too near nor too remote) on a continued line of coast or sea.

This may often be done by a person residing in any country by making enquiries of persons conversant with the coasts, or by directing corresponding observations to be made at different places for a few days only.

If the places differ much in longitude, this ought to be noted, that allowance may be made for the difference of the absolute Time of noon.

If there be any uncertainty as to the rate and course of travelling of the Tide between two places, the doubt may best be removed by obtaining Observations at some intermediate point or points.

It is necessary to distinguish the Time of High water at the *mouth* of a deep bay or sound, from the Time of High water further in. The former is to be taken in all such comparisons as are here spoken of.

Large islands and long promontories much disturb the regular progress of the Tide wave.

Comparative Observations of the *Height* at different places in the same seas, especially if combined with those of the Times, may also be of great value.

All communications concerning any Observations of the above kinds made or to be made in any part of the world will be thankfully received. They may be addressed to the care of the Sec. Asiatic Societies of Calcutta or Madras or direct to

The Rev. W. Whewell, Trinity College, Cambridge;
or, at the Royal Society, London;
or the Astronomical Society, London."

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF APRIL, 1837.

Days.	BAROMETER AT							THERMOMETER AT							RAIN.		Evaporation.	DIRECTION OF WIND.			WEATHER.		
	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.		Morning.	Noon.	Evening.	Morning	Noon.	Evening.
1837	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	o	o	o	o	o	o	o	In.	In	In.						
Apr. 1	29,938	30,010	29,968	29,904	29,896	29,906	—	80,7	84,6	85,0	84,6	84,0	83,7	—	... ...	...	... ...	S	S E	S	Haze F.C.	Th. hz.	Th.haze, lightning
2	,880	—	,918	,872	,872	,878	—	80,5	—	85,7	86,0	84,5	84,0	—	... ...	...	... ...	S W	S E	S E	Clear	Fl. cl.	Haze do. [of rain
3	,895	29,964	,952	,896	,874	,914	—	82,7	86,2	87,0	87,3	84,8	84,2	—	... ...	...	... ...	S	S	S E	Cloudy	Clear	Haze lg. few drops
4	,934	—	,958	,916	,873	,916	—	81,0	—	86,3	87,2	84,7	83,9	—	... ...	...	... ...	S	S	S E	Clear	Clear	Haze lightning.
5	,933	29,982	,968	,904	,874	,924	—	80,6	84,9	86,0	86,2	84,2	83,3	—	... ...	...	5,072	S W	S E	S E	Th. haze	Clear	Haze dew do.
6	,916	,978	,962	,900	,872	,910	—	78,4	84,4	86,0	85,4	83,8	82,4	—	... ...	...	... ...	N W	S E	S E	Th. haze	Th. hz.	Haze do. do.
7	,882	,940	,970	,882	,858	,888	—	78,2	84,3	85,6	84,7	83,5	82,3	—	... ...	...	... ...	N W	S W	S E	Th. haze	Th. hz.	Clear do.
8	,856	,938	,912	,852	,850	—	—	79,0	84,1	86,0	86,3	85,2	—	—	... ...	...	... ...	S	S by E	S E	Th. haze	Haze	Haze do.
9	,894	—	,930	,874	—	—	—	80,6	—	86,2	86,7	—	—	—	... ...	...	... ...	S W	S E	S E	Haze	Fl. cl.	Haze lt.& driz. rain
10	,926	30,042	30,010	,960	29,936	29,954	—	82,8	79,7	78,0	80,5	80,9	80,5	—	1,534	...	... ...	S E	N	N	Cloudy	Rainy	Cly.th.lt.&hy. do.
11	,946	29,998	29,974	,934	,930	,970	29,992	76,5	81,4	83,8	84,3	83,5	82,9	82,1	... ...	...	... ...	N	S E	E	Th. haze	Haze	Clear dew.
12	,934	30,014	,984	,934	,920	,946	,968	78,4	83,8	85,8	86,0	84,0	83,4	82,2	... ..	...	—	W	S E	S E	Fl. cl.	Clear	Clear lightning.
13	,946	29,980	,950	,896	,876	,904	,926	79,0	84,3	86,0	86,9	84,8	84,0	82,4	... ...	...	... ...	S W	S E	S E	Haze	Clear	Clear dew.
14	,884	,930	,900	,848	,822	,849	,872	78,6	84,2	86,0	86,3	84,0	83,9	83,7	... ...	...	... ...	S W	S E	S	Clear	Clear	Th. haze dew.
15	,844	,892	,868	,816	,824	,862	—	79,8	84,3	86,7	87,4	84,3	84,0	—	... ...	...	... ...	S W	E	S E	Haze	Haze	Th. haze —
16	,884	—	,918	,884	,880	,924	29,954	82,2	—	85,3	86,0	84,0	83,2	82,6	... ...	...	... ...	W	S E	S E	Haze fl.cl.	Haze	Haze —
17	,900	29,972	,936	,860	,854	,894	,928	78,5	84,2	86,0	86,0	84,6	84,0	84,0	... ...	...	... ...	S W	S E	S E	Fl. cl.	Haze	Haze —
18	,882	,928	,910	,868	,844	,880	,912	80,5	85,2	86,5	87,0	85,1	83,9	83,5	... ...	...	... ...	S W	S E	S E	Haze	Haze	Clear —
19	,844	,896	,870	,808	,804	,834	,870	79,8	86,3	88,6	88,3	86,0	85,0	84,5	... ...	...	2,721	S	S	S	Clear	Clear	Clear —
20	,832	,874	,862	,800	,792	,798	,845	81,3	85,9	92,0	91,7	87,9	85,2	84,4	... ...	...	... ...	S W	S W	S W	Clear	Clear	Clear —
21	,818	,890	,850	,788	,778	,820	,872	81,7	88,2	92,0	89,7	86,8	86,3	85,6	... ...	...	... ...	S W	S E	S E	Clear	Clear	Clear —
22	,848	,920	,880	,830	,800	,828	,888	82,7	90,1	89,3	89,0	86,1	85,4	84,1	0,700	...	... ...	S W	S	S	Fl. cl.	Clear	Clear —
23	,992	30,020	,982	,948	,926	,962	30,000	82,3	86,0	87,5	87,5	85,8	85,4	83,9	... ...	...	... ...	N W	S	S	Cloudy	Clear	Clear dew.
24	,960	,036	30,024	,984	,946	,984	,006	80,0	84,8	86,5	87,0	85,6	85,3	84,4	... ...	...	... ...	S W	S E	S E	Fl. cl.	Clear	Ciear dew.
25	,958	29,996	29,980	,928	,920	,948	29,976	80,1	85,8	87,0	87,0	85,4	85,0	84,1	... ...	...	... ...	S	S E	S E	Clear	Clear	Clear dew.
26	,926	,980	,972	,924	,912	,952	,990	80,1	85,9	86,5	87,3	86,0	85,0	84,4	... ...	...	3,117	W	S E	S E	Clear	Clear	Clear ——
27	,932	30,006	,988	,932	,923	,970	—	80,3	85,8	87,0	87,6	86,3	85,1	—	... ...	...	... ...	W	S E	S E by E	Th.hz.F.C	Haze	Clear lightning.
28	,932	29,986	,970	,916	,904	,924	29,962	81,7	86,3	87,8	87,6	85,7	85,3	84,7	... ...	...	... ...	W	S E	S E	Fl. cl	Clear	Haze do.
29	,940	,992	,964	,906	,860	,884	,928	82,0	87,3	88,2	88,3	86,1	84,9	84,0	... ...	...	... ...	S W	S E	S E	Haze fl.cl.	Haze	Haze do.
30	,892	,920	,892	,852	,822	,868	,888	82,9	88,2	88,7	88,5	86,8	84,8	84,1	... ...	...	... ...	S W	S E	S E	Clear	Clear	Clear do.
Mean	29,905	29,965	29,941	29,887	29,870	29,903	29,932	80,4	85,2	86,6	86,8	85,0	84,2	83,8									

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF MAY, 1837.

Days.	BAROMETER AT							THERMOMETER AT							RAIN.		Evaporation.	DIRECTION OF WIND.			WEATHER.		
	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.		Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1837	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	o	o	o	o	o	o	o	In.	In.	In.						
May 1	29,894	29,968	29,936	29,873	29,840	29,868	29,914	82,7	88,3	89,6	89,7	87,9	84,5	84,4	... ...	... ...	... ...	S W	S E	S E	Cloudy	Clear	Clear, litng.
2	,892	,960	,940	,882	,854	,878	,900	82,2	88,5	89,0	88,3	85,8	84,7	84,4	... ...	... ...	... ...	S W	S E	S E by S	Cloudy	Clear	Haze do.
3	,886	,962	,914	,872	,832	,880	,910	82,3	88,2	91,3	90,2	87,0	86,7	85,5	... ...	... ...	3,188	S W	S E	S S E	Clear	Fl. cl.	Cloudy do.
4	,886	,922	,898	,838	,808	,834	,876	84,7	89,7	88,8	88,5	86,7	86,2	84,4	... ...	... ...	... ...	S	S E	S E	Clear	Clear	Clear do.
5	,868	,928	,892	,832	,824	,864	—	82,7	89,3	89,3	88,7	86,8	86,0	—	... ...	... ...	... ...	S W	S E	S S E	Clear	Clear	Haze do.
6	,902	,976	,966	,920	,894	,920	29,966	82,9	87,8	88,4	88,8	86,1	86,0	84,8	... ...	... ...	... ...	S	S E	S E	Clear	Clear	Haze do.
7	,946	30,006	,986	,924	—	—	,970	82,7	86,1	86,7	87,1	—	—	84,0	... ...	... ...	... ...	S	S E	—	Th. haze	Th. haze	—— do.
8	,946	29,958	,942	,900	29,860	29,904	,924	81,0	87,2	89,5	89,2	86,4	85,7	85,0	... ...	... ...	... ...	S	S E	S E	Fl. cl.	Haze	Haze do.
9	,908	,948	,922	,874	,844	,904	,934	81,5	88,3	88,9	89,4	87,2	85,5	84,5	... ...	... ...	... ...	S	S E	S E	Clear	Clear	Haze do.
10	,908	,978	,956	,904	—	—	,944	82,2	88,2	88,8	89,5	—	—	85,0	... ...	... ...	3,143	S	S E	—	Haze	Clear	Lightning.
11	,916	,970	,962	,948	—	—	,916	82,9	87,7	88,3	89,0	—	—	85,0	... ...	... ...	... ...	S	S E	—	Haze	Clear	do.
12	,896	,938	,950	,940	—	—	,908	81,9	86,4	88,7	89,0	—	—	85,7	... ...	... ...	... ...	S	S E	—	Clear	Clear	do.
13	,894	,930	,936	,926	—	29,890	—	82,2	87,7	88,7	88,8	—	86,3	—	... ...	... ...	... ...	W	S E	—	Haze fl.cl.	Haze	do.
14	,886	—	,916	,916	—	,884	—	84,0	—	88,2	88,3	—	85,6	—	... ...	... ...	... ...	S	S S E	—	Cloudy	Th. haze	do.
15	,862	29,908	,916	,910	29,886	,880	—	81,9	88,0	88,5	88,6	87,5	84,5	—	... ...	... ...	... ...	S W	S E	S E	Th. haze	Th. haze	Haze litng.
16	,862	,902	,908	,914	,900	,900	—	80,2	86,8	88,0	88,5	86,6	85,3	—	... ...	... ...	... ...	W	S E	S E	Haze	Clear	Haze do.
17	,884	,920	,928	,922	,898	,882	29,882	80,9	87,4	88,6	88,6	86,5	85,6	85,0	... ...	... ...	3,010	S W	S E	S E	Clear	Clear	Haze do.
18	,872	,902	,910	,906	,880	,874	—	81,9	87,3	88,8	89,7	86,5	86,3	—	... ...	... ...	... ...	W	E	S E	Haze	Haze	Cloudy do.
19	,854	,872	,884	,874	,854	,850	—	81,5	84,2	85,6	86,0	85,0	84,8	—	... ...	... ...	... ...	W	N E	E	Cloudy	Cloudy	Cloudy do.
20	,829	,860	,868	,854	,858	,852	—	82,9	84,8	86,0	86,2	85,3	85,0	—	... ...	... ...	... ...	W	N E	S E	Cloudy	Cloudy	Cloudy do.
21	,826	—	,858	,839	,815	,818	—	83,2	—	88,3	86,0	4,5	84,5	—	... ...	... ...	... ...	Calm	N W	S	Cloudy	Cloudy	Cl. do. thr.
22	,812	29,836	,845	,850	,838	,840	—	83,4	87,5	87,4	89,6	5,4	85,4	—	... ...	... ...	... ...	—	N E	N E	Cloudy	Cloudy	Cl. do. do.
23	,824	,858	,860	,860	,836	,832	—	82,3	88,3	89,3	89,5	5,3	85,3	—	... ...	... ...	... ...	N	N E	N	Fl. cl.	Cloudy	Fl.cl.do.do.
24	,838	,864	,866	,868	—	—	29,834	83,3	88,2	89,5	89,7	—	—	86,0	... ...	... ...	2,274	N	N E		Haze	Fl. cl.	Light. do.
25	,822	,856	,870	,870	—	—	—	82,6	88,0	90,6	90,8	—	—	—	... ...	... ...	... ...	N W	N E		Haze	Fl. cl.	do. do.
26	,800	,822	,830	,800	29,840	—	—	81,9	83,1	83,3	78,0	5,2	—	—	... ...	2,457	... ...	N E	N W		Cloudy	Cloudy	do. do.
27	,800	,816	,826	,830	—	—	29,830	79,1	81,2	82,0	82,3	—	—	82,4	0,100	... ...	... ...	S S W	S W		Fl. cl.	Cloudy	do. do.
28	,812	—	,846	,844	—	—	,840	79,9	—	84,4	84,4	—	—	82,8	... ...	... ...	... ...	S S W	S W		Haze fl.cl.	Fl. cl.	do. —
29	,818	29,862	,870	,860	—	—	—	78,1	85,2	87,0	88,0	—	—	—	... ...	... ...	... ...	S S W	S		Clear	Clear	do. do.
30	,822	,852	,872	,878	—	—	29,854	80,3	85,9	87,9	89,2	—	—	84,2	... ...	... ...	... ...	S W	S W		Clear	Clear	do. do.
31	,838	,878	,886	,896	—	—	,866	82,7	86,2	88,4	90,6	—	—	85,6	... ...	... ...	3,202	S W	S W		Haze	Fl. cl.	do. do.
Mean	29,865	29,909	29,902	29,883	29,859	29,870	29,896	82,0	87,0	88,0	88,0	85,6	85,5	[illegible]									

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF JUNE, 1837.

Days.	BAROMETER AT							THERMOMETER AT							RAIN.		Evaporation.	DIRECTION OF WIND.			WEATHER.		
	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 P. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.		Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1837	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	°	°	°	°	°	°	°	In.	In.	In.						
June 1	29,854	29,882	29,892	29,902	—	—	—	82,3	86,8	89,0	90,6	—	—	—	... ...	... ...	... ...	S W	S W		Haze	Fl. cl.	Lightning.
2	,866	,882	,901	,910	—	—	—	84,8	88,3	90,4	94,2	—	—	—	... ...	... ...	... ...	S W by W	W		Cloudy	Fl. cl.	do.
3	,852	,890	,912	,906	—	—	—	86,4	88,6	92,0	94,0	—	—	—	... ...	... ...	... ...	S W by W	W		Cloudy	Fl. cl.	do.
4	,898	—	,930	,920	—	—	—	86,8	—	92,8	95,4	—	—	—	... ...	... ...	... ...	S W	W		Th. haze	Haze	do.
5	,868	29,897	,926	,912	—	—	29,890	86,0	89,8	93,4	91,2	—	—	85,7	... ...	... ...	... ...	S W	S W		Haze	Clear	do.
6	,882	,926	,944	,915	—	—	,886	83,0	89,8	92,6	91,7	—	—	85,7	... ...	... ...	... ...	S S W	S W		Clear	Clear	do.
7	,874	,922	,944	,926	—	—	,892	82,7	91,6	94,0	92,0	—	—	86,3	... ...	... ...	4,437	S S W	N W		Clear	Clear	do.
8	,880	,932	,954	,929	—	—	,900	84,2	90,7	94,0	90,7	—	—	85,8	... ...	... ...	... ...	W	N W		Th. haze	Haze	do.
9	,886	,930	,960	,936	—	—	,890	82,7	90,6	96,0	92,0	—	—	88,4	... ...	... ...	... ...	S S W	S W		Haze	Clear	do.
10	,880	,922	,930	,922	—	—	,890	84,6	90,6	90,5	90,3	—	—	88,0	... ...	... ...	... ...	N W	N E		Fl. cl.	Fl. cl.	do.
11	,884	—	,920	,918	—	—	,868	83,0	—	90,9	91,8	—	—	86,5	... ...	... ...	... ...	S W	S W		Clear	Clear	do.
12	,852	29,906	,912	,898	29,886	—	,880	84,1	92,3	92,0	90,6	88,6	—	86,0	... ...	... ...	... ...	S W	S E	S	Clear	Clear	Th. haze, litng.
13	,874	,906	,906	,894	—	29,903	,914	84,4	88,2	94,0	96,6	—	87,0	87,0	... ...	... ...	... ...	S W	W	S W	Clear	Clear	Cloudy do.
14	,890	,908	,900	,880	—	,913	,912	85,8	89,8	95,0	97,6	—	88,6	87,0	... ...	... ...	4,275	W	W		Cloudy	Clear	Lightning.
15	,894	,902	,898	,890	—	,902	—	84,3	88,2	92,1	95,5	—	88,0	—	... ...	... ...	... ...	W	S W		Clear	Clear	do.
16	,898	,910	,902	,881	—	—	29,848	84,6	88,4	93,2	96,5	—	—	88,0	... ...	... ...	... ...	W	W		Cloudy	Clear	do.
17	,892	,904	,890	,880	—	—	—	83,9	90,2	94,0	94,0	—	—	—	... ...	... ...	... ...	W	W		Haze	Haze	do.
18	,900	—	,844	,764	—	—	—	84,7	—	91,2	92,5	—	—	—	0,107	... ...	... ...	S W	W		Haze	Clear	do.
19	,794	29,832	,812	,790	—	—	—	85,2	90,0	93,0	96,0	—	—	—	... ...	... ...	... ...	S W	N W		Thick hz.	Cloudy	do.
20	,804	,856	,838	,800	—	—	—	86,2	88,3	92,0	92,8	—	—	—	... ...	... ...	... ...	S W	N W		Cloudy	Cloudy	do.
21	,854	,920	,900	,860	29,852	29,900	29,930	86,2	79,0	84,0	85,0	84,8	84,2	83,5	... ...	... ...	4,710	Calm	W	E S E	Cloudy	Cloudy	Cloudy, litng.
22	,886	,932	,922	,900	,848	—	,926	81,7	86,3	88,2	87,8	86,0	—	85,2	... ...	... ...	... ...	S W	S E	S S E	Clear	fl. cl.	Clear do.
23	,908	,952	,936	,908	—	—	,952	82,2	87,6	90,5	90,0	—	—	85,9	... ...	... ...	... ...	S W	N W		Clear	Clear	Thunder do.
24	,944	,968	,950	,908	—	—	,908	80,9	86,2	89,0	90,7	—	—	85,3	... ...	... ...	... ...	N W	N W		Clear	Cloudy	do. do.
25	,944	—	,920	,882	—	—	,906	81,7	—	90,2	92,2	—	—	85,8	... ...	... ...	... ...	W	N W		Haze	Haze	do. do.
26	,892	29,928	,908	,880	—	—	,904	84,2	88,3	92,0	91,6	—	—	85,9	... ...	... ...	... ...	W	W		Clear	Haze	do. do.
27	,872	,938	,922	,884	—	—	,890	83,7	84,3	87,0	88,4	—	—	81,0	... ...	0,077	... ...	S W	W		Fl. cl.	Cloudy	do. do.
28	,870	,912	,904	,872	—	—	—	79,8	83,9	86,3	88,5	—	—	—	... ...	... ...	3,165	S W	W		Cloudy	Cloudy	Lightning.
29	,874	,930	,914	,876	—	29,870	29,904	83,8	86,5	89,3	92,0	—	85,4	84,9	... ...	... ...	... ...	S W	W		Cloudy	Haze	do.
30	,876	,928	,906	,865	—	—	—	83,8	85,8	87,9	88,6	—	—	—	... ...	... ...	... ...	S W	W		Cloudy	Cloudy	do.
Mean	29,878	29,912	29,910	29,887	29,862	29,898	29,899	83,9	88,1	91,2	92,0	86,5	86,6	85,9									

The Instruments with which the foregoing Observations are made, are placed in the Western verandah of the Honourable Company's Observatory, at about 5 feet above the surface of the ground, and 27 feet above the level of the Sea; the Thermometer was made on purpose for the Observatory, and at 75° (the only point at which a comparison has been made) it was found to differ insensibly from the Royal Society's Standard;—the Barometer is one of two Standards which I have lately constructed, and may be depended upon to 0,01 of an inch.

Longitude.....5*h*. 21*m*. 8*s*. E.
Latitude......13° 4′ 85,″ N.

T. G. Taylor,
H. C. Astronomer.

MADRAS JOURNAL

OF

LITERATURE AND SCIENCE.

No. 17.—*October*, 1837.

I.—*Chinese Feast to Disembodied Spirits.*—By Lieutenant T. J. NEWBOLD, *Aid-de-Camp to* Brigadier General WILSON, C. B. *Member of the Asiatic Societies of Madras and Bengal.*

The religious festivals of the Chinese are numerous, and specifically laid down by the board of religious rites in China. The sacrifices are divided into three great classes; the first and most important of which is subdivided into sacrifices offered to the azure heavens, to the earth, to the great abode of ancestors, and to the *Shay Tscih*, or gods of the land. The inferior sacrifices are offered to the planets, ghosts of great and good men, Confucius, the deities presiding over the elements, thunder, clouds, mountains, &c. Those which appear the most attractive in Chinese colonies are the *Yuen Tan*, on their new year's day; the feast of lanterns in the first moon; the sacrifices at the tombs, *Tsing-ming*, in the third moon; the feast of the dragon and *Quantai*, in the 5th moon, and that of *Shaou-e*, to the *manes* of their relations in the 7th moon.

The festival of *Shaou-e* commences on the 1st of the 7th Chinese month, and continues to its conclusion. Strictly speaking, the last fifteen days should constitute its duration. It is offered to the souls of the dead, which, during the month, are supposed by the Chinese to issue forth from the invisible world and visit their relations on earth. Supernatural noises, whisperings, and the rush of these aerial beings through the air, are pretended to be heard. It is said to have been instituted in honour of the descent of a mortal into *Hades*, who rescued his mother, as Orpheus endeavoured to rescue Eurydice, from Pluto's drear domain. The sacrifice to the souls of the dead is of great antiquity in China. Confucius, in the *Chung yung*,* or golden medium, is stated to have declared that, "the man who was free from grief was *Wan Wang*—his father *Wang-ke*—his son *Woo Wang*. His father commenced the career of virtue, and his son continued it. *Woo Wang* continued the virtuous course of *Tae*, *Wang Wang-ke* and *Wan Wang*. He only once buckled on his armour and he gained the empire. His personal conduct was such, that he never lost his illustrious name in the empire. As to honour, he was emperor, and in riches, he possessed all within the four seas. He sacrified to his ancestors in the ancestorial temple, and his posterity preserved the empire.

Woo Wang, was in the decline of life when he received the appointment of heaven (i. e. the empire). *Chow-kung* perfected the meritorious deeds (or wishes) of *Woo-Wang*, paid royal honours to *Tae Wang* and *Wang-ke*, and sacrificed to their ancestors, according to the rites due to the emperor. He extended these sacrificial rites to the princes, great officers of state, literati and common people. If the father held a high office and the son was one of the literati, then he was buried according to the rites of great officers, and the subsequent sacrifices were those of the literati. If the father was one of the literati and the son a great officer, then his funeral rites were such as belong to the literati, and his sacrificial rites such as belonged to a great officer.

"'Confucius exclaimed, the filial piety of *Woo Wang* and *Chow Kung* is universally talked of.' 'In the spring and autumn they put in order the ancestorial temples, arranged in proper order the vessels of sacrifice; put the clothes of their ancestors on a person to represent them and offered the sacrifices of the season. By the rites in the temple of ancestors, are separated the different generations, according to their regular succession.' 'They served the dead as they did when they were alive, and those who are buried, as when they were with them. They served the Great Supreme by the sacrifices offered to heaven and earth, and offered the sacrifices of the ancestorial hall to their ancestors.'"

We gather from what has been said above, that sacrifices to the dead were offered in China so long ago as the time of *Wang Wang*, who is supposed to have flourished about the termination of the *Shang* dynasty, about 1112 years before Christ; and that they are considered by Confucius as necessary acts of religion or filial piety. They are by no means peculiar to the Chinese; the Romans, we are told by Juvenal, offered sacrifices to the manes of their ancestors. It was an ancient custom among them to bury their dead in their dwelling houses. About which their spirits were presumed to hover for the protection of the living. The following notes on the Chinese feast to the spirits of the dead, as celebrated by the colonists at Malacca, were taken on the spot. The ceremonial will probably be found not to differ materially from that observed in the Celestial Empire, as the Chinese settlers, though not at all overburthened by a sense of reverence for their national religion, are remarkably tenacious of the pageants and festivals connected with it, and are moreover excessively superstitious. The number of these settlers in Siam, Cochin China, Tonquin, the Malay Peninsula, and the Islands of the Indian Archipelago is supposed now to amount to upwards of 800,000 individuals, all males. Those in our settlements in the Straits, Penang, Malacca and Singapore, I find, from censuses in my possession, amounted in 1835-6 to not less than 28,854 individuals, who emigrate principally from the provinces of Canton and Fokien. Though contrary, I believe, to the laws of China, emigration is connived at by the government, as it rids the country of paupers, a few of whom return to spend their hardly earned savings in their native provinces, thus creating a double benefit to the state. The prohibitions touching the emigration of the females are still rigidly observed, and have partly the desired effect of bringing back to their native country many wealthy individuals. If these interdictions were abolished, there is little doubt that our colonies to the eastward would be permanently filled by this active and busy people. The Chinese, in spite of their gambling and dissipated habits, are decidedly our most valuable class of subjects in the Straits. I have witnessed their activity in almost every situation, as artizans and mechanics, as navigators, agriculturists, cultivators of spices, miners of gold and tin, as merchants and shopkeepers, and have invariably found them superior, both physically and intellectually, to the Malays, Javanese, Siamese, and natives from continental India, among whom they have to struggle for a livelihood. Without further digression on this interesting subject, I will now return to my notes on the *Shaou-e*.

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* The four books, p. 14, sec. xviii.

Riding out on the evening of the 1st day of the 7th moon, I observed crowds of Chinese in the streets, busily engaged in burning long strips of yellow and white paper, which formed a series of blazing piles, extending nearly the whole length of the street. They set fire to them with small tapers of red wax. These form the first offerings and are supposed to pass into the invisible world as garments, &c. for the *manes*, who on this day are permitted to emerge from the gates of their shadowy abode, and visit their relatives on earth.

On the 15th day of the moon, I visited the *Quan-yin*, or temple, where the sacrifice to the spirits of the poor, and of such as have no surviving relations, is held. The place resounded with the clang of the deep toned gong, and the deafening clash of the Chinese cymbal. Within the walled enclosure surrounding the temple, a large platform was laid out with a number of dishes bearing conical heaps of boiled rice, adorned with slips of gaily coloured paper, shewing Chinese characters. The four angles of the platform were marked by columnar fabrics, constructed of bamboo and studded all over with Malay fruits—principally the *Sintol* and *Rambûtan, (Nephelium Echinatum).* At the bottom rose a huge pyramid of plantains crowned with small flags. Behind this grinned ghastly the boiled corses of a flayed sheep and porker. Vessels, apparently containing their frothy blood, were placed before them. Nearer the temple stood another platform, bearing a table with the seats of the three *Wey-siong* or officiating priests. The inner door of the temple was shaded by the large leafy stems of sugar-canes, decorated with scalloped paper of a bright yellow hue.

In the street, in front of the principal entrance, I observed a third platform, about twelve feet high, illuminated by large tapers of red wax, the light of which was somewhat obscured by the clouds of smoke arising from burning incense. On the platform were ranged baskets of fruit and cakes; among the latter were some shaped like the human hand, divested of three of the fingers, small packs of Chinese cards, opium, and minute cups of porcelain, containing arrack. The baskets and dishes were surmounted by little flags. A table of great length, brilliantly lighted up, and covered with a variety of dishes of Chinese cuisine,* sweatmeats, fruit, &c. stood in the centre of the street. This formed the banquet intended for the expected aerial guests; for each of whom was placed a small cup of tea in the Chinese fashion, without either milk or sugar; one of hot arrack, a little plate of condiments, and a pair of gilt and red *kwae-tsze*, or chop sticks.

A personage called by the Malays, *Hantu Ribut*, the storm fiend, and by the Chinese *Tye-su;* a deity whose province it is to take charge of the souls of men, and to distribute the offerings, presides over the banquet. He is represented by a black hideous image placed on a white pedestal covered with a Chinese inscription in black letters. The face, like that of *Mokanna*, was veiled. The covering was subsequently removed, as will be mentioned, from a visage frightful beyond description, black, covered with whitish blotches; a mouth of fearful dimensions, out of which was thrust a large red tongue. The head was large and covered with red shaggy hair. His apparel consisted of a black and gold vest, partially concealed by the folds of a red mantle thrown over his shoulders. A lion's head, painted green and white, adorns the idol's stomach. The legs are black and appear in all their naked deformity. The right hand grasps a banner on which appeared an inscription in Chinese.

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* The custom of offering dressed meats to the spirits of ancestors was practised by Confucius. We find in the book of *Shang-lun* that when his prince presented him with raw flesh, he had it dressed and then offered it to his deceased ancestors.

At eight o'clock in the evening, the idol was brought forth with music and lights, and placed aloft on the platform last mentioned. The priests advanced to meet it, removed the cover from its face and* bowed down before it. This done they seated themselves at the table on the platform within the enclosure. On the table were placed four large red wax lights, a ritual, two small bronze bells, a vessel of water, two sceptre-like wands, two sticks slightly curved at the end, a small red slab, a cup containing rice, several small vessels, one of ashes, a sword, a red blossom of the *Siantan*, and vases of burning incense. A little after eight, five lay-officials made their appearance; the *Lochu* and four *Tao-kis*, who are the annually elected trustees of the temple fund. They were clad in their purple robes of ceremony, their tailed heads covered by conical caps, from the apex of which flowed a profusion of a substance resembling horse hair, stained crimson. They proceeded to the middle shrine, and afterwards to one of the side ones, where they performed adoration and offered incense. Shortly after this the three priests went through the same ceremony. The chief priest was a benevolent looking old man, clothed in a long brown robe and wearing a hat, not very dissimilar from that at present in use among the dignitaries of the christian church. They then adjourned to the table where the feast was prepared, and finally resumed their seats on the platform. The ceremonies commenced by the officiating priest producing five gilt portraits of the goddess *Hootchko*, to which five adorations were made; as also to the vessel of her ashes, and to the water, as emblematic of the water of immortality. The ritual, which I believe is termed *Nanwaking*, was now opened, and a series of prayers read aloud by the chief priest in a recitative style: the termination of each of the prayers, or certain periods in them, was marked by his striking on the table with the red slab. The two inferiors assist in the service, marking the cadences in the chants, by instruments resembling castanets. At stated intervals the chief priest changed his robes for others of a different hue,[*] rang the bronze bells and sprinkled water, while the large gong of the temple ever and anon pealed forth a deep and sonorous note. The service was conducted with great solemnity, and reminded me of that of the Romish church. Its object, I understood, was partly to invoke the four spirits from the north, south, east and west, and to entreat them to assist in assembling the ghosts of mortals, wandering within their shadowy precincts to partake of the banquet prepared for them, and also to invite the ghosts themselves. This done the priest casts the divining *Keaou pei*[†] or *Shing keaou.* Should they turn up successfully twice out of the three times they are cast, the spirits are supposed to have accepted the invitation, and to have arrived at the temple. They are visible, if we can only believe our Chinese informants, to any person of faith, who will prepare his eyes for the sight by anointing them with the blood of a black sheep.

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* The Chinese forms of adoration consist in what they term the *pai*, *kwei*, and *kow*, bowing, kneeling and placing the forehead on the ground. They were in this instance performed consecutively; the priest bows his head towards the image, sinks on his knees; and from this last position, inclines his body forward, supporting its weight on the palms of the hands, until his forehead touches the carpet of prayer.

The high priest afforded his ghostly guests ample leisure to discuss the good things set before them, by continuing the prayers till nearly midnight. He then took out the sticks of incense, burning in the censers before him; and cast them, one by one, into the open space in front of the platform. The spirits are now presumed to have taken their departure. The names of the contributors to the feast are read aloud, and on a signal given by the priest, the spectators make a rush at the table and carry off all the dishes they can lay hands on. The pillars of rice and fruit are precipitated to the ground, and the whole material of the banquet cleared off in an incredibly short space of time, by hands infinitely less ethereal than those of spirits. Hence this feast is termed by the Malays, *Sambayang Merrabút*, the plunder ceremony. The feast concludes by the burning of the images, paper-houses and mountains, gold and silver paper which are consumed in one large blazing pile, for the use of the departed spirits in the other world. According to an article in the Indo Chinese Gleaner, (ii. 360). " The burning of paper (for a religious purpose) whether gilt or plain, of whatever shape, appears to have been adopted immediately after the abolition of human sacrifices on the death of *Che kwang* (who died about 150 years before Christ), when he caused his domestics to be put to death to attend on him in a future state.* At present the consumption of paper which is annually used on all religious occasions, is very considerable, and forms an extensive branch of trade with the Chinese. The more usual offering is a piece of paper, about a foot long and eight inches broad, in the shape of the front of a bonnet, with a small piece of gold foil on its back; besides which they have representations of men and women, with various dresses, with houses, servants, boats, boatmen, &c. which are burnt and passed into the invisible state for the use of the deceased. Many well-disposed persons in China, allow the priests a certain sum monthly to offer up prayers, and burn the paper offerings for them; and wealthy people often employ men for the sole purpose of offering incense, burning paper offerings, and letting off fireworks on their festivals." The Chinese ordinary oath, as I have witnessed it taken in our Courts of Justice, consists in the person holding in his hand a slip of yellow paper, on which is inscribed an imprecation of divine wrath on his head, should he declare what is false. The paper is set fire to and burnt while retained in the hand. It, together with the inscription, is supposed by this process to pass into the other world and be there recorded.

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[*] "The imperial high priest, when he worships heaven, wears robes of azure colour, in allusion to the sky. When he worships the earth, his robes are yellow to represent the clay of this earthly clod. When the sun is the object, his dress is red; and for the moon, he wears a pale white. The kings, nobles, and a centenary of official hierophants wear their court dresses. The altar on which to sacrifice to heaven is round to represent heaven; this is expressly said. The altar on which the sacrifices to the earth are laid, is square; whether for the same wise reason or not is not affirmed. The "prayer-boards" *Chuh-pan*, are of various colours, for the same reason as the emperor's robes. In the worship of the heavens, a yellow ground is used with black characters; for the worship of ancestors, a white ground is required with black characters; for the sun, a carnation with vermilion characters; and for the moon, a white ground with black characters."—*Art. on State Religion of China—Chinese Repository*, vol. iii, page 58.

[†] The *Keaou-pei* used, were small reniform bits of bamboo having one side convex, with an orifice through the centre.

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* The Scythians, it is said, and some of the Tartar tribes, observed this horrid custom. In China, they anciently made bundles of straw in the shape of human beings, and in the time of Confucius, images of wood, which were interred with the dead. It is to this practice that Mencius alludes in the *Shang Mung* (page 6).

Besides the ceremony, just described at the temple, the private festivals of the different fraternities or *kongsis*, into which the Chinese enrol themselves, are held on the succeeding days of the month, in different quarters of the town; conducted by their respective *Lo-chu* and *Tao-kis*. As these are regularly subscribed for by the fraternity and consecrated to the *manes* of their departed relatives, no indiscriminate sharing of the remnants are permitted; each member carrying off at its termination the dishes he contributed, or is entitled to. The *Wey-siongs* or priests, attended and offered prayers and incense, first to the *Penates** and then to the spirits, who are presumed to be present. The chief priest was on these occasions attired in dun coloured robes; the two others in purple, and carrying small bronze bells. These feasts terminated like that at the temple by a general conflagration of the images, paper, &c. for the use of the spirits. The *Lo-chu* and *Taokis* for the next year were then chosen in the following manner. The *Lo-chu* of the past year proceeded towards the painting of the *Penates* at the end of the room, and lighted several sticks of incense; steadfastly regarding the picture, he cast the divining bamboos, one from each hand, on the carpet, and pronounced at the same time the name of one of the candidates. Should the *keaou pec* turn up successfully twice, he is chosen—if not, the *Lo-chu* proceeds to cast them in the name of the next aspirant.

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* The household gods of the Chinese are generally a triad of deified mortals depicted on a large sheet of thick paper, which is suspended to the wall of the interior of their houses. Offerings of incense are made to them every day at sun-rise and sun-set, and of tiny cups of tea at the new and full moons. The vessels of ashes used at the funerals, about which the spirits of the deceased are supposed to hover, are placed on a small table in front of the picture. The principal figure in the group is that of *Quantai*, king of the west, who is represented in the painting from Canton in my possession as a portly middle aged person, with a rubicund visage garnished by a pair of sedulously cultivated *favoris* and mustachios. A scanty black beard descends from the tip of his chin down his capacious chest. He wears a purple tiara richly embroidered with gold, surmounted by a crimson ball. A white falling collar edged with blue, is fastened with a jewel round his throat. A red vest is almost concealed by a surcoat of light green, lined with pink, which descends to the feet and is emblazoned with the truculent heads of the imperial dragon in gold. It is confined around his ample waist by a red cincture, studded with precious stones, from which depends a long crimson tassel. Emerging from the folds of the robe on the left side, appears the *opou* or purse of red, green, azure and gold. The feet are protected by red slippers made after the Chinese fashion, with thick white soles, turned up at the toes, and ornamented with green and white. He is seated on a throne of a dark reddish wood, over the arm of which hangs the skin of a lion. His left hand grasps one arm of the seat while his right plays with his beard. The right shoulder is ornamented with a richly embroidered badge.

The two other personages are subordinate in the group, and preserve a standing posture. The one on *Quantai's* right is a ferocious looking black, holding the *tai* of office, a sort of poll-axe, adorned with a red tassel, and inlaid with gold. From his right depends a green hilted sword furnished with a blue sword knot. His head is covered with a pink cap embroidered in gold, green, blue and white, a large gilded badge decorates the upper part of the right arm, and a straggling black beard descends on a blue edged, white falling collar. His robe is of various colours.

The figure on *Quantai's* left is frequently omitted. His name is *Wam-poa* and he seems to be the *Mantri* or prime minister, from his bearing the bag containing the imperial signet. His features are benignant and placid; his face fair and of the true Chinese expression, affording a striking contrast to the fierce Tartar countenance of *Quantai*, and the diabolical visage of *Chuchong*. His cap is of a fanciful shape, of various colours and richly embroidered with gold. A blue sash edged with white and gold, confines a plain red robe. The length of the finger nails of *Wampoa* and *Quantai*, imply a life of ease. The bag containing the signet is of a pale yellow, bearing a Chinese inscription in letters of gold on a pink ground.

On the last day of the month, the feast to the spirits of orphan children took place at the temple with great display. The sweetmeat, fruits, &c. on the table were cut into a variety of fantastic forms, scorpions, rats, dogs and centipedes. In place of the hideous *Tye-su*, god of disembodied spirits, the image of a fair and beautiful female, the tutelary goddess of children, having a halo around her head, presides. Two children are represented standing before her. She, however, is doomed to the fire, and takes charge of the paper, houses &c. for the benefit of the infant spirits in the other world. The offerings were so numerous as to form a splendid funeral pyre; and at midnight the goddess sank into the curling flames, amid the clash of cymbals, the noise of gongs and bells, and the chanting of the prayers of the priests.

In the houses of Chinese drug-venders I found the pictures of *Quantsi*, &c. replaced by those of a venerable sage holding a pencil in his hand. With this pencil, which resembles that used by the Chinese for the common purposes of writing, he is said to have effected the most miraculous cures. The druggist did not scruple to tell me a story of the celestial dragon himself, leaving his starry mansion for the purpose of consulting this Chinese Esculapius, on account of a disorder in his eyes, occasioned most probably by a whisk from the tail of a comet. In the foreground of these paintings, I observed one of the sage's disciples busily employed in extracting a bone from the throat of a tiger, who had been a little too precipitate in the process of deglutition.

II.—*A brief notice of some of the Persian Poets.—By* Lieutenant T. J. Newbold, *Aide-de-Camp to* Brigadier General Wilson, C. B.

(Continued from No. 15, P. 237).

Lutf Uddin Nishapúri.

لطف الدین نیشاپوری

Nishapúri was noted for the bad fortune which attended his whole career. *Mahomed Bukhtáwer Khan*, who relates the following anecdote of him, neither mentions the date when this poet flourished, nor gives any notice of his compositions, save a single stanza which is too much defaced, in the copy I possess, to be made out. Thus ill luck may be said to have persecuted him even beyond the dark inquisition of the tomb. But to the anecdote—"It is said that *Nishapúri* one day placed a number of pigeons, which he had taken considerable pains in collecting, together with a vessel of wine and a dish of the *pilau*, termed *mútanjen*, in a convenient spot in the garden, while he went in person to invite the object of his affections, to see the airy evolutions of the birds, and to partake of the good things he had prepared. In the interim some of his rivals scaled the garden wall, devoured the *pilau*, and washed it down with the wine. This done, they seized two of the pigeons, put them into the empty dish, and carefully replaced the cover. The poet shortly after arrived with his mistress, but on taking off the cover, was most disagreeably startled by the sudden flight of the pigeons from their *pilauless* prison. His rivals enjoyed the scene from a corner of the garden, where they had secreted themselves, while the disappointed lover cursed his unlucky stars; which, to use his biographer's words, although he was neither so great a villain as Pharaoh or Shedad, had played him so scurvy a trick."

Majid Uddin.

ماجید الدین

Flourished in the time of *Atàbek Selgur Shah*, and was an intimate friend of *Khajeh Bhài-uddin Diwan*. He had a wife, both old and a shrew, whom he was at last constrained to run away from to Ispahan. The disconsolate spouse, like the old man in Sinbad, was not so easily to be shaken off, but followed his steps to the far-famed capital of *Iran*, with a perseverance sometimes to be met with in ladies of more modern times similarly situated. One of *Majid's* pupils hearing of her arrival, thus maliciously congratulated his preceptor—" Good news. A lady has honoured (lit. descended on) your house to-day." On which *Majid* drily remarked, " It would have been better young man, had you brought me tidings that the house had descended on her."

Selgur Shah presented him on some occasion with a very costly robe, but of not very recent manufacture, having most of the words comprised in the *Kalimeh*, the Mahomedan confession of faith, embroidered thereon in letters of gold. The part deficient was the conclusion of the creed, viz. Mahomed Rassùl Allah, محمد الرسول الله Mahomed is the ambassador of God. Some of his friends on observing this, expressed their surprise at the omission of this very important article of their faith, when *Majid* pleasantly remarked, in allusion to the robe's antiquity, that he supposed it must have been fabricated before the time of the prophet.

Malek Kúmi.

ملک کومي

This poet travelled from Persia to the court of Nizam Shah in the Deccan; after whose death he held some lucrative appointment about the person of Ibrahim Adíl Shah. His compositions are said to comprise nearly a lac of couplets of no great merit. The poet *Zahùri* espoused one of *Kúmi's* daughters.

Malek Razi Uddin.

ملک راضي الدين

Was governor of *Bakr* in the reign of *Abaka Khan;* but for some misconduct was disgraced and the post conferred on the eunuch *Jelal Uddin*, on whom he penned a severe satire. He did not omit to make sarcastic allusion to his rival's bodily defects.

Malek Shah.

ملک شاه

Son of *Takhash*, a governor of Khurassan, was a poet of considerable talent. *Bukhtáwer Khan* does not mention the era in which he flourished.

Auhadi.

اوحدي

A celebrated poet, called also *Maregah,* flourished in the 7th century of the Hejira, and died about A. H. 696 at Ispahan, during the reign of *Gazan Khan,* son of *Arjun Khan.* His tomb is in the city, and is held in great reverence. His tutor, *Shaikh Shehab Uddin,* was a man of great piety, and was accustomed to recite after evening prayer the whole of the koran. *Maregah* thus brought up did not fail to make considerable progress in metaphysical studies. His biographer thus observes in palliation of his being a poet—" Although *Maregah's* elegant and playful disposition led him to the composition of poetry, yet the graver study of the mystic tenets of the *Súfis* was what engrossed his more serious attention; so much so that he accomplished the translation of the book *Jam Jam,* the Mirror of Sufiism, in the incredibly short space of a single month." The first sixty years of his life were passed in indigence and poverty; but finally, " the sun of his fortunes emerging from the clouds of obscurity that shaded its rise, set in glorious splendour and effulgence."

Mir Khosro.

میرخسرو

Flourished in the 14th century of the Christian era. *Khosro* is justly celebrated throughout the east for the purity and elegance of his style. He produced a *khamseh* in emulation of the celebrated composition, known under that title, of *Nizámi,* which it resembles both in subject and metre. The *Durya-i-abrar,* a mystic poem, is from *Khosro's* pen.

Mohammed Katebi.

محمد کاتبي

Or *Bin-Abdallah al Nishapúri,* was born at *Tarshiz* in Khorassan, whence he is sometimes termed *Tarshizi.* He resided at *Nishapúr* under the protection of *Sultan Mirza Ibrahim.* His works are numerous: among them is a poem on the loves of *Bahram* and the fair *Gúlandám*—the *Kitab-i-Husn-wa Ishk*—the *Deh Báb*—the *Nasir-i-Mansúr*—the *Majina al Bahrain* and a *Medah* in praise of the Sultan, every verse of which terminates with the word *Gúl*—a rose. *Katebi,* while reciting this ode was interrupted by the *Sultan's* suddenly demanding from him whence he came. The poet without the slightest hesitation replied to the monarch in the same metre in which he was then reciting,

همچو عطار ازگلستان نشاپورم ولے
خارصحرائے نشاپورم من وعطار گل

" Like *attar*, I come from the rose garden of Mishapùr,
But I am as a thorn of the desert,while *attar* is fragrant as the rose."

Katebi received ten thousand *dinars* for the ode. He bestowed the sum on the poor and indigent. The date of his death may be ascertained by the numerical value of the letters composing the following hemistich, viz. A. H. 886:

مصرع
نماند کاتبی وماند ذکرا و بجهان

Kàtebi remained not, but his name is everlasting in the world.

He is said to have been styled *Katebi* from the beauty of his handwriting. His *khamseh* is on the model of that of the celebrated *Nizami* (2 vol.).

Mohammed Shems-uddin Sózni

محمد شمس الدين سوزني

More familiarly called *Hukkim Sozni*, was descended from *Suliman Farsi*, one of the first companions of the prophet. Some writers aver that he was born at *Sámarcand*,—others, at *Nakshet*, and that having completed his studies at *Bokhàra*, he settled at *Samarcand*, where he died, aged 80 years, A. H. 569; according to *Mahommed Bukhtawar Khan* A. H. 566. *Sózni* was of a lively and agreeable turn of mind, and on this account his society was much sought after by the young and convivial. In their parties he gave free vent to those sallies of wit, for which he is so justly celebrated, and which sparkled in various impromptu repartees, both in prose and verse. He was a needle-maker, as his surname *Sózni* imports, and adopted this handicraft in order to obtain easier access to a damsel, of whom he became passionately enamoured, under pretence of disposing of his needles. Towards the close of his career he retired from the world, in order to devote himself exclusively to the study of theology under the spiritual guidance of *Senai,* and other celebrated teachers. He commenced by performing the pilgrimage to Mecca, which his history tells us was accomplished after the most approved and orthodox fashion. In the subsequent penitentiary exercises he manifested great severity and self denial, and alludes to his sufferings in a *Diwan* comprizing 8,000 verses, wherein all that is touching and pathetic in Persian poesy has been employed to paint the anguish and remorse he felt for his sins. It is said that he appeared after death to one of his friends, and informed him that the Almighty's pardon had been extended to him, on account of the following lines, composed in the highest fervour of devotion:

قطعه

بادشاها من بدرگاهت پناه آورده ام
سر ز راهت برده بودم رو برو آورده ام
چار چیز آورده ام شاها که در گنج تو نیست
نیستی و حاجت و جرم و گناه آورده ام

I have brought into thy presence, oh God! four things that are not in thy treasury, viz.—nothingness, poverty, sin and repentance.

Ruchi, a disciple of *Sózni,* wrote a quatrain on the occasion of his master's death, wherein he observes, in allusion to his surname *Sózni,* "every hair of my eyelids has become piercing as a needle to my eyes, since I can see him *(Sózni)* no longer; and every hair of my body as a thorn in my flesh, in that he is lost to me. Heaven now has, nought for me, save the demonstration of its wrath."

One day the poet *Fazli* found *Sózni* in an assembly of literary men, with a face much inflamed in consequence of a controversy he had entered into with one of his friends. *Fazli* enquired with some astonishment what was the reason of so great an alteration in his looks; *Sózni,* moved by the brusque manner in which the question was put, retorted on his interrogator, who happened to possess a countenance the very reverse of beautiful, "The moment I saw you, my sins came into remembrance and I blushed through very shame." *Fazli* replied, "Why should the sight of me bring your crimes to mind?" *Sózni* rejoined, "I feared lest God as a punishment for them might make me as hideous as you are."

Jeláli, another poet gifted with a nose of surprizing length complained one day to *Sózni* of his having conferred on him the *soubriquet*, "*Kher-i-serkhom-khaneh*"—the ass of the wine cellar; but added that he was not at all vindictive and knew how to bear insults without resentment. *Sózni* pleasantly replied that this patient disposition of his was sufficiently manifest to all the world, seeing that he had borne for 40 years a nose so long and incommodious. Herbelot cites an epigram on this subject written by *Sózni* to the following effect: "Thy immeasurably long nose is a burthen to every one, for it is thrust every where without the slightest discretion. I am well convinced that when thou prostratest thyself it is less for the purpose of devotion, than to disencumber thyself of the weight of a burden alike insupportable to its possessor and to others."

The author of the *Tarikh-i-Guzideh* observes that *Sozni* was also called *Abu Bekr al Beláli*, and dwelt at *Kilas*, a dependancy of Samarcand. *Mahomed Bukhtawer Khan* states that he obtained the appellation of *Sozni* from his affection for the son of a needlemaker. He cites the following couplet as the *Matla*[*] of the ode in which *Sózni* craves divine mercy.

بيت

تا کے زگردش فلک آبگینه رنگ
برآبگینه خانهٔ طاعت زنیم سنگ

"How long through the revolution of the mirror-like heavens shall we continue to cast stones on the crystal mansion of self restraint!" The date of his death is A. H. 566 as appears from the numerical value of the letters composing the following words calculated agreeably to the *Abjad.*

سوزني فحاش دم

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[*] For the explanation of *Matla*, vide Essay on the metrical compositions of the Persians (Journal No. 14, p. 116).

Moulana Maruf.

مولا نا معروف

Cotemporary with *Secunder Mirza*, governor of Shiraz, in whose presence he composed and wrote down, between sunrise and afternoon prayer, one thousand five hundred distiches, for which he was munificently rewarded by the *Mirza*. *Maruf* was remarkable for generosity and his beautiful penmanship.

Muazzi.

موزي

A poet in the service of *Muaz-uddin Malek Shah*; hence his appellation. *Muazzi* had an excellent memory, and could repeat an ode of considerable length after having heard it only once recited.

Mustoufi Ahadi.

مستوفي احدي

Ahadi was born of a good family in the town of *Sabzwar* in Khorassan. Among his compositions is a *Medah*, in praise of *Imam Ali Bin Mússa-ar-Reza*. He possessed considerable knowledge in physic and astronomy.

Najib Uddin.

نجيب الد ين

Was the encomiast of *Kila Wesak*. He died towards the conclusion of the Seljukian dynasty and is better known under the title of *Jer Badkani*.

Najm Uddin.

نجم الد ين

Flourished during the reigns of *Abaka Khan* and *Arjum Khan* his son. He followed the trade of a goldbeater and was accounted a good poet. The following lines are cited by his Persian biographer as a specimen of his style:

نظم

منم زرکوب محصولم بصنعت
بجز فریادے و بانگم نباشد
همیشه در میان زر نشینم
ولیکن هرگزم دانگے نباشد

I am a goldbeater, and earn my bread by my trade;
But cannot get on without clamour and noise,
Though always seated in the midst of gold
I have not a *dank*[*] to call my own.

Màmi Mir Mahomed Màsum.

نامي مير محمد معصوم

This poet was a noble of *Bekr* and one of *Akbar's* courtiers. He was sent on an embassy to Persia, and on the journey amused himself by cutting verses of his own composition on the pillars and mosques where he halted. The following lines of his are cited:

بيت

چون گريهٔ من ديد نهان كرد تبسم
پيد است كين گريهٔ من بي اثر نسيت

"When she saw my tears, her smiles vanished, and it became evident that my weeping was not lost upon her."

Nàsiri Hamdàni.

ناصري همداني

Hamdàni, lived in the reign of *Jehangir*, and is said to have excelled all his cotemporaries in beauty and melody of language. He composed a *Diwan* considered as the "model of eloquence." He shone also in epistolary composition.

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[*] The *dank* is a small coin valued at the sixth part of a *direm*.

Nàsir Khosro.

ناصرخسرو

A poet, physician by profession, cotemporary with *Sultan Mostanser Fatimi Mughrebi,* caliph of Egypt, flourished in the 5th century of the Hejira—*Khosro* was profoundly read in the doctrines of the *Shias* and his opinions on religious subjects were implicitly bowed to by those of his own sect. His poetical compositions are but faintly praised. The name of one alone is mentioned by his biographer, viz. the *Roshnai námeh.*

Názìri Nishapúri.

ناظري نيشاپوري

Nishapúri was liberally patronized by the emperors *Akbar* and *Jehangir.* He was more lauded for his generosity to mendicants and faquirs than for poetical talent.

Newái.

نوائي

Also called *Mir Alishir,* is the author of a *Diwan* written in the Persian and Turkish languages. He composed an ode in answer to the *Bahr-al-abrar* of *Mir Khosro. Newái* was a man of wealth, famed for generosity and his munificent patronage of poets and men of letters.

Nevidi Nishapúri.

نويدي نيشا پوري

This poet was a native of *Nishapúr* as his title imports. He entered into the service of the emperors *Humaiyún* and *Akbar,* in praise of whom he composed numerous *medahs.* He died A. H. 973 and was interred at the city of *Ajin.*

Nezári Kohistan.

نظاري كوهستان

Kohistan excelled in compositions on wine, in its mystic signification. He lived in the reign of *Akbar*.

Nizámi Wrózi.

نظامي عروضي

Namesake and contemporary of the celebrated *Nizámi*, author of the *Majma-un-nuwádir*, collection of wonders. The *Sultan Toghral* one day asked *Wr ózi* whether there was not another poet named *Nizámi*. He answered that there was, and in an extempore stanza confessed his own inferiority.

Nizámi.

نظامي

Or *Sheikh Nizámi Gangiah*, a celebrated poet, lived during the reign of *Sultan Toghral Bin Arselan Seljúki*, in the 6th century of the Hejira. He was the author of five very justly celebrated poems, entitled, collectively, the *Khamseh*, from the Arabic word *Khams* خمس five ; in imitation of which those eminent poets, *Mir Khosro*, *Hátifi*, *Kátebi* and *Jámi* composed theirs.

Of these the *Makhzen-al-asrar* is a poem on ethics and the doctrines of the *Súfis*. The *Shirin-wa-khosro*, the *Leila wa majnún*, the *Herft Paiker*, are all love tales well known in Persian poesy. The fifth and last is the *Secunder* or *Sheref Nameh*, the history of Alexander the Great, a poem of great merit. It commences with the narration of his birth and education under *Nikermas*, father of *Aristo*, or Aristotle, and goes on to relate in successive chapters his victories over the armies of *Rúss* and *Zangbar* (an island supposed to be in the Indian seas)—the construction of his famous mirror—his victory over the Persians under *Dára*, Darius, and the death of that monarch—the destruction of the temples of the Magi or fire-worshippers—his visit to the *Kaabah*, and to the cave of *Kai-khosro;* who, according to Sir William Jones was the Cyrus the Great of the Greeks—his expedition to India and China—his subsequent wars with the armies of Rúss; and finally his travel to *Zulmet* (a dark region at the extremity of the world where the fountain of life is supposed to exist) in quest of the water of immortality, from which he returns without success.

Part the second is called the *Fal Námeh* and is probably the same, alluded to by Mr. Ousely, as the "sixth poem," sometimes added to the "five treasures of *Nizami*." It contains an explanation of the title usually applied to Alexander by Oriental historians of *Zu-al-karnein*, Lord of the two horns—the story of Arasmandas of the *Kibti*, or Coptish woman &c., the coronation of Alexander, his question to *Aflatun* or Plato. The council of the seven sages, viz. *Aristo*, *Wales*, *Balinas*, *Socrat*, *Furfuriùs*, *Hermas*, *Aflatun*. Their opinions and those of Alexander and *Nizami*.

Alexander imagines himself a prophet, and receives letters from *Aristo*, *Aflatún* and *Socrat*. He proceeds to the west of the land and arrives at the city of *Peristan*, fairy land. His second expedition to India and China; he falls sick on his return, makes his will, and writes to his mother and dies, succeeded by his son *Askanderùs* supposed to be the Aridœus of the Greeks.* The work terminates with a brief account of the demise of the seven sages and of Nizami. *Nizámi* describes the auspicious aspect of the planets, as observed at Alexander's birth by the astrologers, as follows. Sol emerging from Aries (*Hamal*). Mercury, *Wtárid*, from Gemini (*Jonza*). Luna and Venus in Taurus (*Saur*). Jupiter in Sagittarius (*Kaws*). Saturn in Libra (*Terazu*). Bahram or Mars, in the sixth mansion. *Asad* or Leo predominant.

In the second part of the *Secunder Nameh* we find the following traditions regarding the origin of the title of *Zu-al-karnein* ذوالقرنين or Lord of the two horns, bestowed by Oriental writers on the Macedonian monarch. First, because the horns had reference to the eastern and western worlds of which Alexander was supposed to be the conqueror. Secondly, because he is represented to have worn two peculiar ringlets on the back part of the head. Thirdly, because he smote the talisman of *Jemshid* with a sword having two blades like the famous weapon of Ali called *Zu-al Fakar* ذوالفقار. Fourthly, because he saw in a dream the *karan-i-falek* enclosed in the rays of the sun. Fifthly, because his age (at the time of his coronation) amounted to two *karans* or decades. Sixthly, when Alexander was at the point of death his likeness was taken by some of his friends who added two horns, by which were typified his two guardian angels ; these according to *Abu'l Masher* were subsequently mistaken for real horns. *Nizàmi* concludes his explanations with a story of Alexander having very long ears, which he concealed for a long time from the world, but the secret was discovered by an unlucky barber, who unable to retain it, breathed forth the fact of Alexander's deformity into a cavern. The story closely resembles that of Midas, and has evidently a common origin with that of the Phrygian king.

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* Aridœus, according to Justin and Diodorus Siculus, was an illegitimate son of Phillip, who succeeded to the throne on the death of Alexander. After a reign of seven years he was cruelly put to death, together with his wife Eurydice, by Olympia mother of Alexander.

M. Antoine Galand, in his "Paroles remarquables des Orientaux," is of opinion, that eastern writers have conferred this title on him, from the circumstance of some Grecian coins of Lysimachus (particularly those of silver, on which Lysimachus is represented with horns) falling into their hands, which they have mistaken for those of Alexander. Their error, he goes on to say, arose from their not being able to decipher the Greek inscriptions, and from the coins being larger and more elegant than those of Alexander.

Of all the reasons just mentioned, I am inclined to think with D'Herbelot, that the first is nearest the truth ; and that the horns have reference to the power and dominion of Alexander, though not in so extended a sense as the French savant and Persian historians would have us to believe. It seems to me highly probable that by the title of "The lord of the two horns," is signified his having been the conqueror of Media and Persia, the sovereigns of which mighty empires are typified in the vision of the prophet Daniel, as the ram with two horns.* M. Galand has not favoured us with any authority for his singular hypothesis.

Nizámi, as previously styled, flourished in the reign of *Thogrul Ben*

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* "An he-goat came from the west on the face of the whole earth, and touched not the ground, and the goat had a notable horn between his eyes. And he came to the ram that had two horns which I had seen standing before the river, and ran unto him in the fury of his power. And I saw him come close unto the ram, and he was moved with choler against him and smote the ram and brake his two horns."

"The ram which thou sawest having two horns are the kings of Media and Persia. And the rough goat is the king of Grecia: and the great horn that is between his eyes is the first king." (Daniel chap. viii. verses 5, 6, 7, 20 and 21).

Arslan, the last sultan of the Seljukian dynasty, who reigned in Irak Persia; and died in the 64th year of his age, shortly after completing the *Khamseh*, A. H. 592. On his death bed he assembled his friends and exhorted them to walk in the paths of piety, and to hold fast the sacred truths of the koran. This done, he smiled and exclaimed—Oh dispenser of mercy! keep me steadfast in the hope of pardon, and preserve me from eternal punishment in admitting me to the joys of paradise. Whilst thus speaking the sleep of death came upon him, so calmly, so softly, that one would have supposed he was still awake.

Nizámi's Makhzen al Asrar is composed in the measure, or *Behr*, *Mútawi Moukuf Sart.*—The *Shirin-wa-khosro* in the measure, *Hezej Makhsúf Musaddas*. The *Leila wa Majnun* in the measure, *Hezej Akhzab Makbùz Makhzùf Musaddas*. The *Heft Paiker*, in the measure, *Khafif Muktu*, and the *Secunder Nàmeh* in the measure, *Mutakàrib Maksur Musamman*. I shall conclude the notice of the contents of the *Secunder Nameh* with a few cursory observations on the Oriental and Grecian accounts of the parentage, &c. of Alexander.

Alexander of Macedon سکندر مقدونیه is a monarch, even more celebrated in Oriental history, than in the classic annals of Greece and Rome. The accounts regarding his parentage and birth in both are various and conflicting. Some Persian writers contend that he was the son of *Darab*, sometimes confounded with Darius Nothus, by a daughter of *Filikùs* or Philip of Macedonia; and half-brother of *Dara*, Darius Codomanus. This princess is said to have been repudiated, when pregnant by Darius, and sent back to the court of her father, where the birth of her infant, Alexander, took place. Philip brought up and educated him as his own son. Others affirm that Philip, while engaged in the pleasures of the chace, found the corpse of a beautiful woman in the forest, with a newly-born infant by her side: Philip moved by compassion ordered the funeral rites to be performed over the remains of the unfortunate parent, and adopted the infant, the future conqueror of the world, as his own. According to *Abu-l-faraz*, *Said*, and *Yusuf Bin Gorion*, quoted by M. Claude Visdelon, Alexander was the son of Olympia, the consort of Philip, by *Nectanebe*, king of Egypt; who having been expelled from his throne by Artaxerxes Ochus, fled in the disguise of an astrologer, and took refuge in Macedonia.

Nizàmi alludes to the two first of these traditions, and states them to be unworthy of credit. He then proceeds to tell us that Alexander, *Secunder*, was the son of *Filikùs*, a celebrated monarch, whose sway extended over the regions of * *Rùm* and † *Rùss*, and whose place of abode was in Macedon and *Yúnán*, Greece. The name of his mother does not appear; but *Nizàmi* describes her as a lady of Philip's court of surpassing beauty and majestic stature.

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* Under the term *Rùm* روم, Greece, Rome, Romelia, Turkey and even the whole of Europe, have been comprehended by Oriental writers. It is, however, generally understood to be the name given by the Arabians to the country in Asia Minor, subdued by the Greek and Roman emperors, and subsequently by the Turks, which is conjectured to have derived its name from *Rùm*, one of the sons of Esau. Subjoined is the excellent description of D'Herbelot:

Art. *Roum.* " C'est le nom que les Arabes, et autres Orientaux, ont donnè aux pays et aux peuples que les Romains, et ensuite les Grecs et les Turcs ont soumis à leur obeissance.

" Il faut pourtant distinguer les deux significations que ce mot peut avoir. Car, outre cette generale, de la quelle on vient de parler, Ebu Al Ouardi dans sa Géographie intitulée, Kheridat Alágiaib, en donne une particulière. Car il dit que le pays de Roum commence à l'ocean Atlantique, ou occidental, et comprend, le pays de Gialaleca, la Galice, Andalous, L' Espagne, Afrangiah, la Françe, Roumiah l' Italie, Nemsiah, l' Allemagne, Leh, et Tcheh, la Pologne, et la Boheme, Inkitay, l' Angleterre, Magiar, la Hongrie, jusqû à Constantinople, et au Pont Euxin, par où il joint le pays des secalebah, ou, slaves, et esclavons qui confinent avec les Russes, ou Moscovites. Et enfin, le pays dit encore plus proprement, Roum, Romaniah, et Roumiliah, qui est la Thrace, et la Grece d' aujourd'hui.

" L' auteur du, Massahat Alardh, l' etendûe de la terre, écrit dans le second traité de sa géographie, que le pays de Roum, dans lequel il comprend seulement une partie de l' Asie Mineure, a à son occident, Khalig 'Al Constantinè, le canal de la mer Noire, à son midy, Belad Scham, et Belad Gezirah, qui sont la Syrie, la Mesopotamie, Arminiah, ou l' Armenie, au Levant et au Septentrion, Belad Kurg, qui est la Georgie, et Bahr Bontos, le Pont Euxin; et qû au milieu de ce pays de Roum, est Gebal Carman, la Montagne de Caramanie, c. a. Le Mont Taurus, où habitent plusieurs familles Turques, et Turcomanes, dont la chaîne s' etend depuis Tharsous, qui est Tharse en Cilicie, jusqû à l' Hellespont. Et c'est dans ce pays de Roum trés proprement dit, que regnoient les Sultans de la dynastie des Selgiucides, appelez par les Arabes, Selagekah Roum, les Selgiucides de Roum, et d' où les Tures Ottoman qui regnent aujourd'hui à Constantinople, ont pris leur origine, ce qui fait que les Persans et les Mogols aux Indes appellent les Turcs encore aujourd'hui, Roumi.

" Les auteurs Musulmans disent, que Roum, qui a donnè le nom a ce pays là, etoit un des enfans d' A'is, qui est Esaû, ou, Edom, ce qui fait dire à Hamdi Tchelebi dans son histoire de Joseph et de Zulikha, écrite en Turc, que Dieu donna plusieurs enfans à Esaû, et qu' il y en eut un d' entre eux, hommé, Roum, qui a donné son nom a tous les Roumilar, c. a. à tous les Grecs et Romains, et que les Princes Souverains de ces nations ont porté le titre de, Caiasserah, c. a. de Cesars."

† *Rùss* روس signifies Russia; according to Richardson, so termed traditionally after *Rùss*, the eighth son of Japhet. It is here supposed to indicate the countries immediately to the N. W. of Persia.

Such are the statements of the Persian writers. We will now turn to those of the Greeks, by many of whom Alexander is said to have been the offspring of Olympia by an enormous dragon, while others give out that he was her son by Jupiter. M. Visdelon informs us, on what authority I know not, that he was the son of this lady by a Persian *Magi* named *Nestabánus.* "Ce qui peut être vrai en cela, est que suivant le rapport de quelque Historien Grec, *Nestabánus*, Persan de nation, et Mage de Religion, vit Olympius. Ce seigneur l'etoit venu trouver, la foudre á la main, et dans tout l'equipage de Jupiter; soit que ce fut une veritable fraude, ou une pure collusion de la Dame. Se même auteur ajoûte qú Olympius avoua la chose á Philippe." It is well known that Alexander himself instigated by personal vanity, or rather perhaps for political purposes, encouraged the report, spread abroad by flatterers, of his divine origin. After the conquest of Darius, he caused himself to be worshipped as a god and led his army over the scorching sands of Lybia, to the oracular temple of Jupiter Ammon, there to be saluted by its sycophantic priests as the son of Jupiter.

These statements it will be allowed are equally contradictory with those of Persia. Mr. Ousely in a note to his Epitome of the Ancient History of Persia (p. 26) remarks, "It is not surprising that the Persian traditions on the life of Alexander should be vague and discordant, since the Greek historians acknowledge the obscurity of this subject." "Of Alexander" (says Arrian, Proem :) "various persons have recorded various things; nor is there any one of whose history there have been more writers, or writers more disagreeing one with another."

The opinion of *Nizami*, from whatever source derived, and of those Grecian authors who suppose Alexander to be the son of Philip by Olympia, appears to have the best foundation. For it would be absurd to imagine that Philip would prefer a nameless foundling to his own offspring, or that the Macedonians would accept him rather than a prince of the blood royal as their sovereign.

The early Persian historians, who inform us that Alexander was the son of Darius, were, no doubt, influenced to do this both by a feeling of national vanity which would not allow of their admitting the subjection of the great Persian empire by a foreign prince, and through a desire of ranking among their own hereditary sovereigns, a monarch whose deeds of arms and character for wisdom had been noised over the whole habitable world. The idle tale of his being the son of a dragon or of Jupiter is not worth while alluding to.

Mr. Richardson in his learned dissertation on the languages, literature and manners of Eastern nations (p. xiv) asserts that the Persian version of the history of Alexander corresponds with that of Greece and Rome, in nothing but the catastrophe, the death of Darius. Although it must be confessed that there does exist a great difference in the shading and filling up of the minor details of the two portraits, still there appears to me a striking resemblance in the outline and more prominent features. For instance, both Persian and Grecian writers agree in the mystery attending his birth—that auspicious omens attended it—that he was educated at the court of Philip with or by Aristotle—also in the age at which he was crowned, viz. two *karans* or decades—Alexander's imagining himself a prophet is probably a Mahomedan version of his aspiring to divine honours—in his expedition to Egypt—the Persian conquest—the circumstances attending the death of Darius—Alexander's espousal of the daughter of Darius, Roxana, or, according to the Persians, Roshana—his two expeditions to India—the visit paid him by the Amazonian queen Thalestris, as related by Q. Curtius (the *Noshábah* of the Persians), and the duration of his reign. The Persians fix the exact site of the place of his death at Zour, the Greeks at Babylon; both cities, however, are in Assyria.

According to D'Herbelot, *Abùlfaraz* fixes the duration of Alexander's reign at 12 years; the author of the *Tárikhi-Jehán-árá* at 14 years. This first nearly agrees with the calculation of Petavius, according to whom, Alexander

Was born	356 A. C.	Archon Elpines.
Philip died	336 A. C.	Archon Pythodorus.
11th year of Alexander	326 A. C.	Archon Anticles.
Alexander died July 29	324 A. C.	Archon Hegesias.

He was the last of the 2d or Kaianian dynasty of Persia.

III.—*Memoir Descriptive of the Vurragherry and Kunnundaven Mountains.—By the late Captain* B. S. Ward, *of the Surveyor General's Department.*

Situation and extent.—These lofty regions lie to the west of Dindigul, south of the famous temple of Pulney, and north of Perreakolum in the valley; their length from east to west is fifty-four miles, and their medium breadth fifteen miles, and their superficial area 798½ square miles (a very small portion of which, estimated at fifteen square miles, is under cultivation); the whole forming a confused mass of lofty ridges, intersected by deep valleys and ravines. The central parts, almost divested of wood, are plains, covered with a short stunted grass, the exterior ridges sloping down towards the low country, and the valleys they form are covered with high forest, more luxuriant and affording a greater variety of timber the nearer they approach the open country. These aerial regions are designated by the natives who reside on them, Keel and Mail-mullay (this may signify high and low), but more properly is a distinction of eastern and western mountains; those to the west rise to a very great elevation, some of the most conspicuous eminences being between six and seven thousand feet above the level of the surrounding plain, and fall excessively steep on the south, presenting at their summit a perfect wall of granite; to the north and east sloping down in extensive broken ridges, towards the open country; to the west falling gently and forming the valley of Unjeenad; and from it again to the south and west they rise abruptly into lofty mountains towards Travancore and Coimbatore. The cites of the villages on them are pretty nearly on the same elevation, and may be about 4000 feet above the open country. The inhabitants of these regions, are chiefly composed of the *Kunnuver* and *Karakat Vellaler* castes, and the population amounts to near 4000 individuals of both sexes.

Towns and Villages.—On that portion of the mountains to the east, denominated Keelmullay, and seen from the rock of Dindigul, the villages of note are Poolatoor, Tondygoody, Munnalur, Punnaymullay, Patchelur, Perryur and Kowinjee; these have all a number of hamlets, lying promiscuously on the slopes of the valleys, amidst dry grain cultivation and plantain groves. On the sides of the streams, are narrow tracts formed in terraced beds, on which paddy is cultivated, irrigated by artificial canals; they also rear some wheat and garlic in the vicinity of the western villages of this tract. This division of the hills has a very fair proportion of forest, with groves scattered in the neighbourhood of the villages, among them the jack, mango, orange, sago palm, and other trees, are spontaneous. The houses are in irregular clusters, built of mud and thatched. On the approaches to some of the larger villages are the remains of barriers, or gate-ways, as at Punnymullay, on a lofty ridge commanding an extensive view of the country towards Dindigul. Vilputty, Poomburra, Munnamaneor, with their subordinates, occupy the highest and central part of these mountains, and are all of them of some magnitude, having a large population. They are pleasantly situated on romantic projecting brows, commanding extensive views of the surrounding valleys and mountains. The houses are divided by regular paved lanes, and a principal street generally passes down the middle, with, at either end, a gateway, or barrier. The slopes in their vicinity are beautifully diversified with terraced fields on different levels, in which is cultivated garlic, mustard, tennay (*Pannicum Italicum*); also wheat, and a species of grain similar to oats, by the natives called fovaray.[*] In lower valleys the rice fields gradually rise in a succession of terraces almost to the very summits of the ridges, irrigated from above by a succession of artificial canals, ingeniously conducted along the slopes, from dams thrown across often distant rivulets. Marshes are met with in low situations, where drainage is prevented by ridges crossing the valleys. In some of these, on the more elevated parts, the *wussumbu*, or sweet flag root, is obtained. This portion of the mountains, is divested of wood, a few groves in the ramifications, and some solitary trees on the slopes, being all that is to be seen. The jack, mango, and other useful trees, growing in profusion in the eastern portion, are unknown here, and fuel is now generally brought from some distant grove. The houses, built of stone and mud, and well thatched, are spacious, and, though low, are comfortable. They have each a fire-place, and sheds attached for their cattle. There are a few pagodas in sequestered situations at all these places; the only one of note, dedicated to Vailapúr or Subramunny, is at Poomburra. It is built of stone, has a respectable spire, and is highly venerated. An annual festival takes place here, when the car is decorated and drawn down the streets; the other temples are all inferior buildings and generally thatched.

The western portion of these hills, called *Mailmullay*, but better known by the appellation of *Kunnundaven*, is now a dependency of Travancore. Its superficial area is 231½ square miles, of which three square miles only are under cultivation. The north portion is studded with the villages of *Unjeenad*, a few being extensive, as *Khandel*, *Keelandur* and *Poottur*, and most of them beautifully situated on a table land. Nachyvile, though the capital, consists of only a few straggling houses, belonging to the *munnadies* or chiefs. It is situated in a low open valley, on the left bank of the Ambrawutty river, which meanders down the centre in its course north; and to the N. W. of it is Murraoor, a large village on a slope of the hills, with extensive cultivation of rice about it. The slopes of a table east of Nachyvile, hemmed in by black rocks to the north and west, on which is the village of Kharoe, are also extensively cultivated. Here they also grow some dry grain in small quantity. About the villages on the upper table, garlic and sugar-cane thrive. The cultivation of the latter is at present confined. Wuttawaddy, composed of two hamlets, occupied by about 15 Kunnuver families, may be mentioned for its situation in a narrow and deep valley, secluded from the sun's rays for four hours in the day, a circumstance which will give some idea of the elevation of the hills about it. At this place is some flat rice land, and the hamlets are situated on low but commanding eminences on either side. The pagoda of Teneashy on the left bank of the Ambrawutty near Nachyvile, is held in veneration, and is the only building of note in this tract. Here and there, on the black rocky ridges in the valley, are many of those antiquated small buildings, known by the designation of Pandy Coolys, some of them perfect; it is impossible to obtain any correct account of their origin.

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[*] Barley.—R. W.

Rivers, &c.—On these mountains are the sources of upwards of thirty large streams, which uniting, form eleven respectable rivers, the larger portion pouring down in a succession of falls into the plain country to the N. E. and S. E. Those of note in the eastern portion are the Jyempolliam river, having its sources in the chain of the Arunganul hills. It flows by Tondygoody, where it receives the name of Perryar, it then winds S. by E., and rushing down the mountains at the head of the Iyempolliam valley, is joined by the Shutar stream; passing by Punnacad, it now winds E. by S. in a deep forest to the hamlet of Shadamoopenputty. It passes through an open valley, the banks low, and bed sandy, where it is fringed with some cocoa-nut and mango groves near Iyempolliam. Here a dam crosses it; thence it runs S. S. E winding much, with steep banks, through dry cultivation to Tyencotta and Vadiputty. It crosses the high roads N. E. and S.

of Batlagoonta, and passing Dodiankota, joins the Vigay river, having run a course of twenty-two and a half miles from its source.

The Oomayar, rising in the Boothamulla hills, after fertilizing the table-land of Pauchelur, is joined four miles from its source, by the Kullar, a small stream from the Vaulrungatty hill. Thence, by the name of the Kodavenar, it flows S. E. three and a half miles; E. by N. two miles, through a narrow wooded valley; is joined by the Kolluparae stream running S. into it, from the table-land of Perryar; then flows in a winding course easterly, obstructed by rocks, and precipitates itself down the mountains to the N. E. of Munnaloor; thence, skirting the hills a short distance through a deep forest, it enters the plains, and joined by a large rivulet from the Audaloor hill four miles W. of Ahtoor, winds past the above place.

The Maunkurray, a small river, has its source in the northern summits of the Audaloor and Punnymullay mountains, winds down a wooded and confined very rocky valley, till it approaches the plains of Godulabavy. In its course through the flat country it has many inflections; a rich soil is formed along its banks, and eight miles from its source crosses the road towards Pulney, east of Godulabavy, previous to which a portion of its water is turned south into the Thetthumpully tank; thence it flows east.

The Nankasi or Nangangy river has its principal source in the Putchamullay hills, four miles S. E. of Veerupatchy, and descends to the west of it by the appellation of the Vaykalar, and being joined by the Perenkairymulla, issuing from the Perryar range of hills, slides down the N. W. face through a narrow wooded valley, fringed with teak and bamboos; shifts for a short distance northerly, occasioned by the junction of a large rivulet from Patchelur, and winding through a flat expanse of forest to Purpul, a desolated hamlet, receiving in its course the Kunnanur and Vuddacad streams, precipitates itself down the hills to the lower table-land of Kotahvully, in a perpendicular cataract of 150 feet, into a basin worked in the rock by the force of its waters; escaping from which, it slides down a flat rocky bed, confined by precipices to one and a half furlong (where an artificial canal is conveyed from it), continues its course over a rocky bed, again precipitating itself to the base of the hills, half a mile from the above fall. These cataracts are called the *mail* and *keel tullacooth*. In the vicinage of the lower one, a romantic spot, is an ancient temple of Neelamulla Allaghercoil, held in veneration, and of high celebrity in times past. The Nankasi then flows north, passes west of the ruins of Veeruputchy, and crosses the high road a mile and three quarters from the lower fall.

The Autucul river issues from the summit of the Aurunganul hill, descends abruptly down its slopes, and fertilizes for three miles the narrow vale of Perrumpullum, winds N. W. one mile and a half, and west one mile and a half through a narrow and deep valley, pours down in a series of cataracts, and, turning S. S. W. one mile and a half, receives the Kowinjee stream. The latter having run a course N. by E. six miles from its sources in the Permal range, is now called the Vurdaputnum river, winds N. W. three and a quarter miles to a dam constructed across it, the channel from it winding north runs towards Ayagoody. About two furlongs below the dam, a small branch goes off and is conveyed into a tank south of the above place; the river now splits in two, unites again about a mile below, and half a mile farther on has a strong dam across it. The canal conveyed away on the right bank flows south of the hill of Pulney, and ultimately discharges itself into the large tank west of the temple. The river now assumes the name of the Wurretar, and, running a devious course of four and a half miles N. W. by W. through an open tract, discharges itself into the Palar, one and a half mile W. S. W. of the temple of Pulney, having run a serpentine course of seventeen miles from its furthest source.

The Palar rises in the open slopes in the Kullerungavvay hills, and only a short distance from the southern summit of these mountains. It flows in a small stream to the east, north of Shumbaganur, and N. E. five miles from the source rushes down by a series of cataracts between hills, to where a road crosses it to the east from Vilputty (here it is called the Munjarraar), and a short distance below receives the Vilputty, a powerful stream on the left, rushing down the ramifications of the Turdulla and Tinnewurray chain of hills, which swells it to a considerable stream; it then flows N. N. W. winding in a deep valley with shelving banks. On either side are tracts of paddy cultivation almost to Kapacad, an open spot on the right bank. In a winding it here receives a large stream from the Permal chain, and several lesser ones on the left. Rushing down the ramifications of the Tinnewurray range, it now makes many serpentine windings, labouring as it were to escape from the mountains, and ultimately precipitates itself into a deep chasm N. E. two and a quarter miles, from Koyconda; thence, confined between precipices, glides down in a thick forest over a rocky bed to the Iyempully *anni* or dam. Here a small branch [illegible] it is ingeniously conveyed into a canal from its right bank, Quitting the hills, it meanders through a forest N. W. to Mampully, a mausoleum on the left, and Cunnavoymulla, a detached hill on the right. Here it gently assumes a northerly course through jungle, with several windings, flows half a mile west of Balsummoodrum, and passing on, receives the Wurretar on its right, and unites with the Perundelar W. N. W., two miles of the temple of Pulney. This confluence is considered sacred, and is called Shunmogen (literally six faces), by which appellation it is known in its course north. From its source it runs a course of twenty miles in a general N. N. W. direction, and, fed by mountain torrents on either bank, on quitting the mountains swells to a respectable river about one hundred yards wide with a deep bed. Across it is a dam one and a half mile S. W. of Balsummoodrum.

The Porundel river rises in the northern slopes of the southern summit of these mountains, in the open vale of Chummutancuvvay, winds gradually down it four miles, receives a powerful stream on the right, and below this confluence the road from Poomburra passes it to Vilputty; then confined winds three quarter of a mile to the N. W. and turns sharp to the N. E. and N., and, confined by lofty precipices, dashes down in a series of cataracts for four miles. On the right it receives the combined waters of the Pallunkye valley; these, pouring down in a confined cataract, give the river a N. W. course for a mile. On its left bank it receives the Poomburra stream, rushing down the slopes of Kowdamulla, flowing west of Poomburra, and receiving in its course the rivulets from the Kolatamulla hills. Thence it rapidly pursues its course along a succession of wooded valleys, and down several cataracts, until after a course of twenty-four miles it finally joins the Palar. From this stream several canals are conducted for the irrigation of several large tracts of land. It is known by seven names in different portions of its course; first, it is called the Koondur, which name it retains for several miles; afterwards the Ulular, and lastly, when it reaches the plains, the Porundalar.*

The Munnul or Putchar has its sources in the Oolurunkuvvay and Kellaven heights, forming the northern slopes of the hills, and pursues a north-easterly course down a series of steep descents, and through wooded valleys, in the progress of which it is joined by several smaller streams, and, finally, after a run of thirteen miles, falls into the Perandular. Two dams are thrown across this stream for purposes of irrigation, but one of them is unserviceable.

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* As in the pages of this Journal it can scarcely be necessary to follow the minute details which the author has thought desirable for the illustration of his map, and as enough of these have been given to show how minutely he examined the courses of insignificant streams, I propose greatly abridging the remaining portion of this section of his Memoir.

The Koodrayar has its sources in a marsh, on the west slope of the Kowdamulla hills, and pursuing a north-westerly direction, reaches the plains after a devious course of about sixteen miles, during which it is joined by several other considerable streams. As it enters the plains a dam is thrown across, and there is a deep canal on its left bank.

The Kodyurtanar, one of the feeders of the Tainar, rises on the southern heights of these mountains, and, taking a westerly direction, receives, about four miles from its source, a large stream from the Kowdamulla range on the right. Thence descending and repeatedly changing its direction, it is swelled by the addition of numerous large streams, pouring down from the hills on either side, until at Mungaputty, it is joined by the Cheggatar, after which it assumes the name of the Tainar, having now after a course of twenty-five miles, become a river of considerable note, unites with the Ambrawutty.

The Ambrawutty rises in the mountains of Tullar, east of Anymuddy, and rushing down the Unjeenad valley, is joined by the Arrewalla, a large stream, as well as by several others; flows by Nachyvile and the pagoda of Tenashy, on the left; somewhat further on it is joined by the Chinnar, forming a large stream, in which an island is formed, and then forms the fall of Jackumtavul, and, after being joined by one or two small streams, occupies a bed 200 yards in width. Here it is joined by the Poongatode on the left, and is arrested by a dam. Its length from its source till it enters the plains is about twenty-five miles. The Chinnar which falls into it has a course of about eleven miles running in a very rocky channel, and forming, from its source to its confluence with the Ambrawutty, the boundary line between Coimbatore and Travancore.

The Uttoiday is another tributary stream of the Ambrawutty, which it enters a little to the south of the confluence of the Chinnar, and forms a further portion of the boundary between Coimbatore and Travancore.

The Koondully rises in the southern mountains of Unjeenad, and, in a westerly course of seventeen miles, is joined by the Nuggraar on the right, and the Munnalar on the left, besides several other hill streams from the mountains on either side.

Roads, Passes and Defiles.—There is not one communication up to or on these mountains of an easy and gentle nature; every path leading to them has its dangers and difficulties, and as laden cattle are constantly on the move up and down, accidents are not unfrequent, especially when the paths are steep, winding as they often do on the edge of precipices, where a single false step hurls the unfortunate animal to the bottom of some deep abyss. The path from Coimbatore across the mountains into Travancore, is, perhaps, an exception, and is much frequented by merchants travelling with laden cattle. This is the only road of note both practicable and comparatively easy. On crossing the Chinnar, it leads over a rather flat surface to the Pambar or Ambrawutty, one and a quarter mile. The cattle are here made to swim across, while the merchants pass over a temporary bridge of twenty feet space, between rocks; through this chasm the river rushes with great violence (only, however, during the periodical rains), thence it ascends a narrow ridge winding on the slope of hills, with the river in a deep hollow on the right, S. W. three and a half miles, it again ascends, and crosses a rivulet two miles, thence ascends a rugged acclivity, and along a flat surface to Shoracolum on the left, one mile. Passing a tract of paddy land, it ascends a paved defile to Keelundur, on the left three miles. From this village it ascends another defile, winds along low slopes (Khandel and Poottur on the right), and ascends, with many windings, the steep pass of Annuwurray, two miles (a road to Mummamanur here goes off to the left from the summit); it assumes a southerly course and crossing some ravines, winding over open table-land, descends to Coondullaytavalum six miles, thence in the same course, river on the left, crosses at three miles to Palacuddavu river, winding on the right, re-crosses it at Nuggraar one and a half mile, river on the left, keeps winding on easy slopes to Sundunakanultavalum, and crosses the river again below its junction with the Moonar six miles; the road assuming a southerly course, crosses the Moondrapully, on the right of which, it ascends to a pass W. N. W. of Chokanad hill, two miles, and enters the Naremungalum hills, after having perambulated a desolate tract of about thirty-one and a quarter miles from the Chinnar. This road is only frequented from January to July, and from the excessive length and difficulty, as also from rain at intervals, the merchants from Oodumullaycottah make but one trip; they start lightly laden with some cloths and culinary articles, and return with areka nut in the months of June and July; the largest portion of this time they keep moving by gentle stages.*

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* In revising this portion of Captain Ward's Memoir for the press, I have been induced to take the liberty of suppressing the remainder of his rather prolix and unentertaining itinerary notices, under the impression that the country being unknown and unfrequented,

Woods and Jungle.—It has already been noticed that the summits of these regions are bare of wood, with the exception of a few stunted groves in sequestered situations. In the hollows and cavities a low brushwood of various plants entwined, mostly thorny and almost impenetrable, affords a close shelter to the wild hog. From the summit of the mountains, sloping down to the plains, the ridges, and the valleys formed by them, are crowned, the former with an open forest of various trees, among which some species of the Myrobolan are not unfrequently seen, also stunted teak. In the higher valleys, on the sides of the streams at their bottom, the forest is closely entwined with creepers, and in those at their bases, and bordering the plains, as also on some of the lower table-lands, teak, bamboos, and various timber trees thrive in quantities, especially on the northern and eastern sides; to the south there is some timber of an inferior size and quality.

Mines and Minerals.—None of any kind were observed: but the granite, which here forms immense precipices, also ridges of black

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they can scarcely be rendered interesting, even to a reader about to visit the hills, and because they could not serve to direct him in his excursions without the aid of a guide. The above extract from this division of the manuscript is introduced, therefore, not in the hope that it would enable the traveller to find his way from Coimbatore to Travancore, but to show the general character of the roads by which the intercourse over these hills is carried on. From it we learn the very bad quality of the roads generally, since the best, said to be the only one both practicable and easy, is attended with so many obstacles and difficulties that it requires nearly a month to travel about thirty-two miles with lightly laden beasts of burthen. This example shows, in a striking point of view, the necessity that exists for some extra expenditure towards facilitating the intercourse, by improving the roads, between the plains and the hills, as well as between the numerous small villages scattered over them, since it is next to impossible, that any considerable advance can take place in the condition of the inhabitants, while they continue in their present almost impassable state.

The necessity for such expenditure will be rendered still more obvious, when I add that, such is the value of the products of the hills to the inhabitants of the plains, these roads, bad and almost impassable as they are, during a great part of the year, are traversed by numerous droves of laden cattle, carrying on an extensive traffic, not only between the inhabitants of the hills and plains, but between those of the plains on the opposite sides of the mountains. I would urge this measure the more strongly, because Mr. Blackburne, the very zealous Collector of Madura, has already ascertained that very much may be done to lessen the difficulties of these roads, at present in many places little better than sheep tracks, and greatly facilitate travelling, at a very moderate cost and which if judiciously expended, would, there is every reason to believe, be productive of the greatest benefit to the inhabitants. On this subject I beg leave to refer to my paper in the 15th Number, where the subject is more fully treated of.

R. W.

stones. Iron ore may be procured from the sandy beds of the streams; it may be obtained also from some kinds of black stones, but no advantage is taken of either.

Manufactures.—At Unjeenad on the west, some coarse black sugar, (jaggery), is manufactured in some quantities: ghee or clarified butter is made at all the hill villages, all, however, is consumed by the inhabitants, beside the above there is no other article manufactured on them.

Exports and Imports.—From the eastern portion of these mountains the exports to the plains may be classed under the following heads: turmerick, vendium or fennugreek, mustard, castor oil nuts, honey and wax, plantains and other fruits from the central parts; garlic is the chief export, with some mustard, wheat, wussumbu or flag root; from Unjeenad, paddy and small quantities of garlic are exported into Coimbatore. The imports to the central parts are rice (in case of a bad harvest); and to all parts of the mountains, apparel, household furniture, implements of husbandry, salt, and every other article requisite, are imported by merchants; the inhabitants also come down to the plains at stated periods, and purchase or barter for such necessaries as they may have occasion for.

Soil and Productions.—Scarce any difference is observed in the nature of the soil of these mountains, it being, in general, a stiff red clay, inclining to brown, and in the more moist situations it is a fine black mould; in the marshes, a deep black clay, the effluvia from which is considered unwholesome; it is excessively poor in lofty situations and more so in the central parts. The productions are rice, tennay, or the Indian panicle, garlic, mustard, wheat, tovarray, a species of grain similar to oats, to the east, turmerick, fennugreek, also several sorts of dry grains, as shamay, vurhaghu, raggy, &c. together with plantains, castor oil nuts, honey and wax: in Unjeenad some sugar-cane and beetle. The several sorts of dry grains produced in these regions, are only equal to the consumption, with the exception of such as are particularized under the head of exports.

Cattle and other animals.—These do not differ from those of the plains in their make or size, but appear on the whole to be in better condition, from the superiority of their pastures. The cows produce but small quantities of milk, and of an inferior quality, owing, it is believed, to the want of salt, which the grass and herbs on the hills appear to be destitute of; as a remedy for which, the natives to the east preserve their urine in vessels and mix it in the cow's drink. The oxen, as also buffaloes, are employed in agriculture, a few of the former in carrying burdens, for which service however the tattoos are more in requisition. These small horses, being driven up in herds to the eastern hills, are very prolific and breed largely. The wild animals are the buffalo and elk who browse on the loftier hills, as also wild sheep of two descriptions, a few spotted deer in the lower regions, and the wild hog more numerous in the Kunnundaven hills. The red and flying squirrels are rare animals, seen only in the larger forests. That great animal the elephant, so famous for its depredations on fields and plantations, is never known to visit the more lofty regions, but periodically makes incursions on the lower table-lands of the eastern hills, as also into the valley of Unjeenad; they are numerous at the foot of the mountains.

Implements and mode of husbandry.—The implements in use are in every respect similar to those of the plains, in short are all obtained from the low country, and though the lands are prepared by ploughing, the garlic, mustard and wheat fields, undergo also the operation of digging and levelling, performed with the mamittys (spades); the seed being sown, the remainder of the labour of digging, weeding, and watering, devolves chiefly on the women, who are assisted by the men in taking in the harvest. Garlic produces two crops in the year, one in the month of August, the other in March. The rice fields are attended to by the polians and other classes till harvest time. The seed is sown in January and February in Unjeenad, the harvest follows in June, a second crop is obtained in January. On the hills of Poomburra and Munnamanur, they sow the paddy in October, the harvest, from the poor state of the soil, is protracted until June and July following; consequently there is but one crop obtained on these hills, yeilding an average of twelve fold. It is a singular circumstance, worthy of notice, that cranes and other birds which swarm in all the rice fields in the low country, never frequent these aerial regions, nor are any crows, kites or sparrows seen or known to visit them; the small dove is not uncommon, also blue pigeons, the latter, however, is a bird of passage, for the period they remain taking shelter in holes under precipices.

Climate.—The climate of these regions is very mild and congenial to the health of the inhabitants, the thermometer, during the months of June and July, was never observed to fall below 50$_0$ or above 75° ; i is, however, said to be extremely cool after the rains in January and February ; the ground is represented as covered in the morning with a hoarfrost and during this season the inhabitants complain of agues In April, some heavy showers of rain are experienced, ushered in with thunder and lightning, it is, however, warm from March till July, when they have partial showers, which increase daily, with strong bleak westerly winds, with short intervals of fair weather ; till October, during this period they are enveloped in fogs, and the rivers swell in torrents after every shower. The N. E. monsoon, which now sets in with heavy showers of rain, ceases in the latter part of December, when the bitter cold weather sets in. Unjeenad, however, is on the whole a warmer climate, notwithstanding it experiences the same vicissitudes of the seasons and is more exposed to strong winds blowing down into it from the S. W.

Origin, Customs and Manners.—The primitive inhabitants residing in these mountains are the Kunnuver Vellalers who resorted to them, it is supposed, about four centuries ago ; they may be classed with the Vellalers of the plain : yet they differ in their habits and manners, scarcely having any intercourse with each other, or forming any connection by marriage ; this latter circumstance may however in some degree be attributed to the difference of climate, the extreme cold of which the inhabitants of the low lands are unable to endure. It is still more singular that even among themselves they have peculiar habits and customs, which distinguish those in the east from their western neighbours (the latter consider themselves as something superior), and have no communication with each other in marriage. The Kunnuvers of the east, by way of distinction, invariably use a teakwood stool when performing the marriage ceremony, those to the west are not so particular. The bride and bridegroom are seated on stools, the floor of the house being previously garnished with cowdung, and fantastically ornamented with streaks of flour of corn ; when the operation of sprinkling saffron water is over, the husband performs the most important part of tying the tally, a small golden ornament, around the neck of the bride, the whole concludes with an entertainment to the relations and friends of both parties. The Puryum, or marriage gift to the relations, of the bride, is a pair of oxen, but to the west a single bullock, or sometimes a cloth is given as a present to the mother of the bride. Incontinency is, however, very predominant, and a separation between man and wife not unfrequent, originating often in mere caprice. If a man feels an inclination to alienate himself from his wife, he has only to make his intention known to her parents, who receive her back with an offer of a pair of oxen; to the west, she is turned over simply with a vutty or metal dish, in use to eat victuals out of. In case a woman is displeased with her husband and absolutely wishes to part from him, she is at liberty to do so, only she must leave all her golden trinkets, if she has any, to the husband, those of silver she takes, it being considered as her own property: to the west, however, the wife is only permitted to take back such articles as she may have possessed before marriage, and if she has any children, they are left behind as the sole property of the husband. Should such separation take place when the woman is in a state of pregnancy (and in the interim she be married to another man), the child when born must revert to the legitimate father: the care and expense of nursing it, to the east, is recompensed by a donation of thirty fanams; towards the west it is delivered to the father on his demand, and no recompense made. The children of such a connection are allowed to grow up, and then return to their real father, who is bound to receive and protect them. A woman may marry as often as she chooses, but can have only one lawful husband at a time, though she may bestow her favours on another, provided he be of the same caste, any intercourse with a man of another tribe, would tend ultimately to expel her from the caste. A man may marry, if his circumstances will admit, as many wives as he pleases, for concubinage among them is not permitted, and to a man of some opulence two or three women are necessary in his domestic affairs; they are also very useful in the fields, the toilsome labour of weeding and watering devolving chiefly on them. Among the western Kunnuvers a rather singular practice is supposed to prevail in case of an estate devolving on a female from default of male issue; she is prohibited marriage, but undergoes the ceremony of being betrothed to some part of her dwelling; she is, however, allowed to have an intercourse with the opposite sex, and to the offspring of such a connection, if a male, the estate devolves. The women of the eastern parts are very uncouth and wear brass and metal necklaces, with a profusion of bangles on their arms and legs, and bore the membrane between their nostrils; the latter is also done by the women of the west, who are rather superior, and more modest in the wear of ornaments, a few stone or glass beads round the neck, called kulpashy, and rings, are their only decorations; they wear a white cloth, not very clean, from above the shoulders, knotted in front, and made fast, round the waist with a bandage, those to the east wear theirs similar to the females of the low country. The men are very simple in their attire, having a couple of cloths, one worn round the head and the other about the waist, seldom or never wearing sandals, and by way of ornament, display a few golden trinkets pendant from their ears. Their dialect is the Tamul, which they speak fluently, but they are illiterate. The Kunnuvers burn their dead, but barren women, as also those who die of the small pox, are buried.

The Karakat Vellalers.—These people are the primitive inhabitants of Unjeenad, or five counties or portions into which this division appears to have been divided on their first settlement in these regions. They are considered a people of superior caste, their customs and manners affording indications of it, though they are not in any manner esteemed above those of the same caste in the low country. A bramin usually performs the duties at their temple, and the other ceremonies, marriages, &c. are performed by a pundarum, or priest of their own sect, speaking the low Tamul; most of them are illiterate, but a Tamul school has of late been established at Murraoor. They are a very abstemious race, and rice constitutes their principal food, as also tire, milk and butter, nor have they any aversion to fowl and animal food, and use ghee, (butter clarified), as a substitute for oil; with it they also anoint themselves previous to bathing; they are not addicted to spirituous or fermented liquors, but opium is in use among them in moderation, and they chew and smoke tobacco. The apparel worn by both sexes does not differ in the least from that of the inhabitants of the plains, consisting chiefly of coarse white cloths; the women, besides the small ornaments worn in the nose and ears, decorate their arms with silver bracelets, and those whose circumstances will not admit of its being of silver have them made of brass; a few of the men have one of the exterior membranes of the nose bored, and all invariably decorate their ears with rings; sandals for the feet are prohibited among them—they are known to associate with the Kunnuvers to the east, though their customs and manners greatly differ; both castes make no scruple of eating what is cooked by the other, but a Kunnuver when invited to an entertainment by a Karakat, is not admitted to that part of the house where the meals are dressed, nor is he allowed to touch any of the cooking implements. This class by the laws of their sect are contracted in marriage when very young, but the union does not take place until the parties are at an advanced age, owing, it is said, to a deficiency in the number of females among them; some of the men are on the above account obliged to lead a life of celibacy. A plurality of wives, which is not uncommon, is only admitted in case the first proves barren, but a connection of such a nature cannot take place without the consent of the first wife, which must be obtained, and a widow is by no means restricted, she being at liberty to marry another man, if she feels so inclined, but they often prefer remaining in widowhood. Chastity does not appear to be a leading virtue with their women.

The marriage ceremony is performed at the house of the bride; a pandal being raised before the door, under it the parties about to be united undergo ablution, they then retire into the house, and are seated on the floor, previously garnished, with their faces towards the east, a lamp is kept burning on a stool, also a measure full of paddy and a symbol of Vignashuer made of cow dung, on the head of which are stuck two blades of the arruvumpilla grass, to it the bride and bridegroom prostrate themselves, on rising, the relatives present the tally, a small golden trinket, to the bridegroom, who ties it round the neck of the bride, a basin of milk being introduced in which is steeped some arisha leaves, *Ficus Religiosa*, with which the elder relatives sprinkle some of it on the heads of the bride and bridegroom; they then get up and prostrate themselves before their joint relatives, and the marriage concludes with an entertainment; on distributing beetle to the company, the bridegroom accompanied by his bride retires to his own house, where the day after he entertains the friends and relatives. The *puryam* or marriage gift is thirty fanams, and a cloth given by the bridegroom to the bride's relations; the money is converted into jewels to adorn her person. Estates invariably devolve to the eldest son; in case there be two or more, the property is equally distributed among them. They purchase their proedial slaves the Polians, the price of a male is thirty fanams, that of a female fifty. She is considered of more value for the children she may bear, who, when born, are the property of their master.

IV.—*Meteorological Experiments made on the Goomsoor Mountains.—By Lieut.* JOHN CAMPBELL, *Assistant Surveyor General.*

These observations are, from the want of leisure and from the inconveniences of a moving camp, necessarily very imperfect, but, in the absence of better, they are offered to the public, for the purpose of shewing the approximate height of the hilly tract west of Goomsoor, and in the hopes they may be of some use in shewing the relation between the wet bulb thermometer and the dew point; but no inferences on this subject have been attempted, in consequence of my not having seen Professor Apjohn's formula for this purpose; and on this account some preparatory observations, made with the instrument at different places in the Northern Circars, have been added to the register.

The hilly ranges of Goomsoor form part of an elevated tract of mountainous country, which extends from Gundipoor and Battily on the Calingapatam river, on the south, up to the Mahanuddy on the north. Their average distance from the sea is about thirty or forty miles, and they extend inland in width about sixty miles, where they meet the plains of the Sompore, Potanalkaulahunchy, and Jeypore countries. The extreme elevation is 2,500 feet above the sea; the lowest 2,000 feet.

In the south they are inhabited by a race of men called Sowrahs; in the north by the Khonds : these races in manners and habits are much the same, and both are distinguished by a peculiar pectoral mode of enunciating, although the language of both is quite different. The average height of the hills above the diluvial soil which fills up the valleys between them is about 1,500 feet, they are composed of granitic, trap, and porphyritic rocks, and are generally but scantily covered with jungle.

During the time the observations were made the climate was in general pretty healthy, and although sometimes the dew point underwent great alterations, yet it was commonly pretty regular; although it was found that, before the dew in the morning had been dissipated by the sun's rays, the hygrometer commonly gave the dew point two or three degrees too low.

The thermometer used was a small one of a six inch scale by Dollond, which agreed pretty well with the thermometer in the stem of the hygrometer by Newman. The wet thermometer was a small one taken out of the ball of a Daniel's hygrometer by Jones, and the bulb covered with muslin and wetted with common water, as it was found to give the same indications as when wetted with distilled water.

To test the indications of the wet bulb thermometer the black ball of the hygrometer was covered with muslin, and both balls being wetted the enclosed thermometer gave the same indications as the small wet bulb thermometer, and therefore there appeared no reason to doubt its accuracy on account of its being small.

The barometer was a very rough instrument on the wet tube plan, and the scale very imperfectly divided. The observations have therefore been given reduced to the temperature of 32° Fahrenheit. The mean pressure at Chicacole at 10 A. M. was found to be 29.71; at Berhampore 29.75, and at Aska 29.68, which are sufficiently accurate to give confidence in the indications of the last instrument.

The hygrometer was one on Daniel's construction made by Newman, and the observations were generally repeated on any change of the dew point to ensure accuracy.

Barometrical Observations made on the Goomsoor Ghauts.

1836

Monecheeserroo	22d November	8 A. M.	27.19
	———	9 A. M.	27.27
Buchingiah	27th do.	6 A. M.	27.46
	———	9 A. M.	27.60
	28th do.	1 P. M.	27.40
	29th do.	7 A. M.	27.37
	———	10 A. M.	27.42
	30th do.	9 A. M.	27.60
	1st December	Noon	27.61
	———	2 P. M.	27.49
	2d do.	8 A. M.	27.58
	5th do.	10 A. M.	27.66
Woodigherry	1st January	11 A. M.	27.86
	———	3 P. M.	27.66
	2d do.	Noon	27.74
Sarrungurrah	15th do.	3 P. M.	27.39
	16th do.	7 A. M.	27.53
Sonepore on the Mahamuddy	11th February	3 P. M.	29.24

Thermometrical Observations in the Northern Circars.

Names of place of observation.	Date.		Time of day.	Dry ther.	Wet bulb do.	Dew point.	REMARKS.
	1836			°	°	°	
Munsoorcottah	July	29		84	79½	77	
		31	8 A. M.	83	80	79	Day cloudy,hot,close—no wind.
		—	4 P. M.	83	81	77	
	Aug.	2	7 A. M.	80	78	77	Morning clear, bright—heavy rain in night.
		7	3 P. M.	84	81	79	Strong wind all day—warm and damp.
		13		83	79	77	Damp day,cloudy,wind easterly.
Poondy........		22		87	80	75	Cloudy, dry, warm.
Chicacole......	Oct.	2	2 P. M.	85	71	61	Weather dry, no rain for some time.
		3	7 A. M.	77	70	67	Little dew in night.
		—	10 A. M.	81	73	66	
		5	8 A. M.	78	70	66	
		6	11 A. M.	83	70	62	
		7	10 A. M.	83	73	65	
		8	11 A. M.	84	73	65	
		13	3 P. M.	87	75	68	
		18		79	69	63	Morning cold, wind N. W. from the hills.
		19	8 A. M.	75	65	61	Cold morn. a little dew
		22		85	71	63	Dry, windy, cold.
		26	1 P. M.	85	73	66	
Calingapatam...		27	9 A. M.	81	73	69	Dry, sky clear, no rain for some time.
		28	6 A. M.	69	64	64	
		—	7 A. M.	67	65	64	
		—	9 A. M.	79	71	67	
		—	Noon.	82	69	68	
		29	7 A. M.	73½	67	64	
		—	Noon.	83	72	66	
		—	5 P. M.	82	74	69	
In camp at Itchapore....		31		79	77	75	Rain,ground saturated, tent damp, wind.
Berhampore...	Nov.	3	7 A. M.	79	76	75	Heavy rain for three days, tent damp.
		—	2 P. M.	86	77	76	
		4	6 A. M.	77	76	73	
		—	9 A. M.	81	78	75	
Aska..........		11	6 A. M.	65½	61	60	Rainy night, every thing wet.
		—	9 A. M.	69	67	62	
		—	2 P. M.	84	68	57	
		12	7 A. M.	68	65	64	
		—	9 A. M.	73	69	66	
		—	2 P. M.	83	73	66	
		13	7 A. M.	69	67	66	
		—	2 P. M.	84	71	64	

Thermometrical Observations on the Goomsoor Ghauts.

Names of stations.	Date.	Time of day.	Dry thermom.	Wet bulb do.	Dew point.	
	1836		°	°	°	
Moneecheeserroo..........	Nov. 21	6 P. M.	68	61	58	Evng. warm, no dew.
	22	6 A. M.	56	55	55	
	23	Noon	71	62	59	
	24	6 A. M.	55	50	45	Day dry, strong wind at N. W. no dew, very cold.
	—	6 P. M.	—	—	49	Wind fallen.
	25	8 A. M.	—	—	49	Minimum in open air 43"
Buchingiah....	26	1 A. M.	49	46	45	
	27	6 A. M.	43	40	37	Minimum 34"
	28	1 P. M.	77	55	—	No dew at 42" at the time of observation, minimum 33°
	29	7 A. M.	50	47	42	Minimum 32"
	Dec. 1	6 A. M.	43	42	39	Minimum 36°
	—	1 P. M.	77	60	—	
	—	2 P. M.	80	60	—	
	2	8 A. M.	57	54	50	Minimum 36"—morning clear, hay fog lying on ground, dew copious.
	—	3 P. M.	78	60	—	
	—	8 P. M.	62	54	50	
	3	8 A. M.	70	60	52	
	—	3 P. M.	72	60	—	
	4	3 P. M.	76	61	—	Minimum 36"
	5	——	—	—	—	Minimum 38"
Bavelamat	6	7 A. M.	56	50	50	
	—	10 A. M.	70	—	50	
	7	8 A. M.	55	53	50	
	9	8 A. M.	54	52	49	
	10	6 A. M.	49	47	45	
	—	11 A. M.	65	58	49	
	13	11 A. M.	69	55	43	Minimum 35°
	15	——	75	60	—	Minimum 43° maximum in tent 78½°
	16	11 A. M.	69	57	—	
	—	3 P. M.	76	62	—	
	17	9 A. M.	69	57	47	Minimum 46° maximum 78°
	19	1 P. M.	71	61	—	
Putlingiah	20	9 A. M.	68	60	50	
	21	——	—	—	—	Minimum 36°
	22	1 P. M.	75	63	—	

Thermometrical Observations on the Goomsoor Ghauts.

Names of stations.	Date.	Time of day.	Dry thermom.	Wet bulb do.	Dew point.	
	1837		°	°	°	
Woodigherry..	Jan. 1	9 A. M.	70	55	—	No dew at 46°. This place is in a large plain of 25 square miles.
	2	8 A. M.	65	52	—	No dew at 39° minimum in tent 42° maximum 81°
	3	8 A. M.	65	52	—	No dew at 39°
	—	8 P. M.	—	—	42	Minimum 46° maximum 81°
	4	7 A. M.	53	51	45	
Cormingiah. ..	6	7 A. M.	58	52	41	
	7	8 A. M.	71	64	56	Minimum 47° maximum 76° in tent.
	—	3 P. M.	79	62	52	
	8	7 A. M.	62	59	55	Minimum 45° maximum 76°
	9	8 A. M.	67	60	51	Minimum 41°
	10	7 A. M.	70	61	52	Minimum 42° maximum 75°
	—	10 A. M.	75	62	—	
	—	2 P. M.	74	59	46	
	11	10 A. M.	76	63	52	Minimum 42°
	12	——	—	—	—	Minimum 40°
Gottingiah	14	10 P. M.	54	49	—	
Savorugudda ..	15	Noon	75	58	—	This place is a large plain, 3 miles wide and 6 long.
	16	7 A. M.	61	58	53	Minimum 45°
	17	——	—	—	—	Minimum 40°
	18	9 A. M.	72	59	48	
	—	11 A. M.	75	58	—	
	19	6 A. M.	52	52	—	Minimum 40°
	—	7 A. M.	58	55	—	
	—	8 A. M.	64	59	—	
	—	11 A. M.	70	55	—	
	—	1 P. M.	76	57	—	
	20	7 A. M.	66	57	48	Minimum 41°
	—	2 P. M.	80	61	—	
Safpayenda.....	24	Noon	86	61	—	This place is a small valley surrounded by high hills.
	—	2 P. M.	86	62	—	
	—	4 P. M.	80	60	—	
	28	Noon	84	60	—	Sun powerful.
	—	1 P. M.	84	59	—	

V.—*Suggestions for an Apparatus for Registering the Tides.*—
By Lieutenant J. Campbell.

TO THE EDITOR OF THE MADRAS JOURNAL,

Dear Sir,—Mr. Prinsep in his letter to you regarding the observation of the height and time of arrival of the tide wave, having offered no suggestion as to how the observation may be made, I therefore offer the following remarks. On the east coast of the Peninsula the surf every where prevents any possibility of ever guessing the time and heights of high water, and in the small rivers the bar is always so shallow as to prevent the influx of sufficient water, so that the head of the river is always much below the surface of the sea, and the current continues to run in long after the time of high water, until the sea has again fallen to the level of the river.

I believe an attempt was made sometime ago to register the tide by a float in the end of an iron pipe brought in from beyond the surf, but I believe it soon choaked with sand. I conceive that the required observations may be made beyond the surf, by having a large bamboo with the divisions bored through, set up beyond the surf and supported by four ropes under water, attached to small wooden anchors, the lower end may be allowed to enter six feet into the sand, and a round board fastened to the bamboo will prevent its sinking further. Above this board an aperture should be cut to allow the water to enter and the sand to fall out, which may be thrown in at top. The top of the bamboo being five feet higher than high water mark, the height of the water within the bamboo may be shewn by a rod attached to a cork float, and a flat wooden scale may be fixed on the rod with inches painted on it, which can be read off by a telescope from the shore. A piece of wire passing through a slit in the scale will ensure its being kept parallel to the shore.

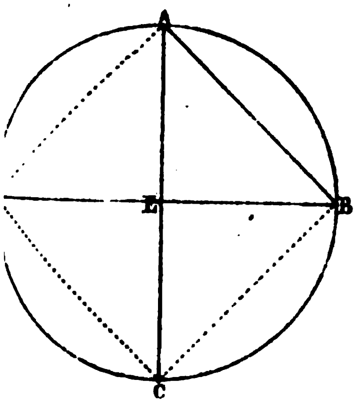
A palmira tree might be used for the bamboo, the tree being split into two pieces and the pith removed, the pieces being again fastened together with rope.

I remain, dear sir, yours truly,
John Campbell,
Assistant Surveyor General.

23*d August* 1837.

VI.—*On the relative proportion between Circular bodies and their Squares.—By Captain* CORTLANDT TAYLOR, *of the Madras Artillery.*

Being on a mission to the Malabar Coast connected with timber for the Ordnance Department at Madras, I found the native dealers in that article at Calicut disposed of timber cut to the *square,* varying about thirty per cent. from their measurement in the *round log.* I was induced in consequence to fall back upon school recollections, to ascertain how far this method was correct or borne out by theory, and which the subjoined mathematical process enabled me to do.* As the results, for comparative data, may be of practical utility, perhaps its dissemination will not be unattended with benefit.



Let ABCD be a circle, and the diameters AC, and BD, perpendicular to each other; then are the triangles AEB, BEC, CED, and DEA (formed by the radii of the circle and the points ABC and D being joined), right angle triangles and similar; having the common centre E a right angle in each; the legs AE, BE, CE, and DE (or circle's radii), equal; and the lines or hypothenuses AB, BC, CD, and AD, also equal, and together forming an inscribed square to the circle ABCD.

Then, as the circumferences of all circles are to their diameters, as 3.1416 is to unit; so 3.1416 is to 1, as the circumference of any given circle ABCD, is to its diameter, DB: but DB the diameter is the double of EB the radius, and EB is one leg or side of the right angle triangle AEB, of which AE is the other leg, and AB, is the third side, or hypothenuse.

Then, as in right angle triangles, the square of the hypothenuse is equal to the sum of the squares of the other two sides; in the right angle triangle AEB,—$BE^2 + AE \overset{2}{=} AB^2$: but as BE, and AE are equal, their squares are equal also, and $2, EB \overset{2}{=} AB^2$ or $V2, EB \overset{2}{=} AB$, the *one-fourth* of the pevimeter of the required square.

Thus knowing the circumference of any circle, the pevimeter, or measurement of the inscribed square, can be easily ascertained; and

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* The sale of the slabs pays the sawing expenses of squaring.

vice versa, knowing the square, the circle can be obtained and the difference or loss on the latter being squared is known.

Practical Illustration.—To illustrate this demonstration by numbers. In the above figure, assume the measurement of the *inscribed square** ABCD at *one hundred* (say inches), of which the side AB is one-fourth or twenty-five. Then in the right angle triangle ABE (as before), the square of the hypothenuse (or side AB), or 25^2, is equal to $AE^2 + EB^2$; that is $625 = AE^2 + EB^2$; but as AE and EB are radii of the same circle and equal, their squares are equal also, and $625 = 2\,EB^2$; or $\frac{625}{2} = EB^2$; or $\sqrt{\frac{625}{2}} = EB$; or again $\sqrt{312.\,5} = EB$ (Extract root of 312—5).

```
          312.5 (17,6776 the root,
                1
              ----
       27  |  212
           |  189
      --------
      346  | 2350
           | 2076
     --------
     3527  | 27400
           | 24689
    ---------
    35347  | 271100
           | 247429
   ----------
   353546  | 2367100
           | 2121276
```

That is 17.6776 is equal to EB; but EB, or radius of the circle, being half the diameter DB, then the diam. DB, is equal to 35,355.

Again (as before) unit is to 3.1416 as diam. DB, or 35,355, is to the circumference of the circle ABCD; or thus, 1 : 3.1416 : : 35.355 (by common rule of three), to 111.072. QED.

So, as an average for any general purposes of the department to which I belong, or for any merchant or artisan in his vocation, 11 *per cent* may be used as the difference between any cylinder and its square; or, by the common Rule of Three, as 111 is to 100, so is the measurement of any known circle to the square of that circle.†

A sphere or round body *cubed,* would of course suffer double the loss, or give a difference of 22 per cent.

Cochin—Malabar Coast, 16*th July* 1837.

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* This is working the *reverse way*, but as it enabled me to come, by a single process, to the required information, it was adopted.

† The decimal .072, or $\frac{72}{1000}$ *per cent* may, for any practical purposes, be omitted as insignificant, but should a greater degree of accuracy be required, it may be obtained, I may say, *to fractional nicety*, by the addition of unit to the *sum of per centage* of every 1400,—which would so be, $14 \times 11 = 15 + {}_4 1 = 155$; or as 1400, is to 1555: and a half or double, &c., in proportion can also be used if necessary.

VII.—*Heights of the Neilgherry Hills.*—*By Captain* J. UNDERWOOD, *Madras Engineers.*

In the very interesting paper on the geological features of the Neilgherries by Dr. Benza (No. 13 of the Journal) the height of Sispara at the Koondahs above the sea has been recorded as about 5620 feet. Several observations by myself with a very good glass barometer fix the height alluded to at 6742 feet, and as I am not aware that a section over the hills from north to south has either been taken or published before, I have the pleasure to forward herewith the barometrical heights from the foot of the Koondah ghaut to Ootacamund, and thence down the New Seegoor ghaut to Seegoor at the foot of the latter.

Table of heights above the level of the sea:

Koondahs.	Sholay, bottom of the Koondah ghaut.	893.11	
	Bamboos cease	1757.6	South westerly direction from Ootacamund.
	Ladder hill (bottom of)	2972.	
	Vullycand camp (top of ridge)	4140.3	
	Vullyaur (river)	4050.6	
	Murraypett bungalow	6742.	
Avalanche range.	Avalanche ridge, top of,	7732.37	
	Avalanche bungalow (at bottom of ridge)	6720.2	
	Ootacamund lake level	7361	

New Seegoor ghaut. Commencing at the SevenCairn Hill.	Blink Bonnie, 4 miles from Ootac. top of New Seegoor ghaut	7204	North direction from Ootacamund.
	Sapperpooram 1 mile down	6758.5	
	Stonehenge about 2 miles down	6182.17	
	Red Hill below Kulhutty, Burgher village about three miles down	5940.5	
	Waterfall point, proposed site for traveller's bungalow, about four miles down, and eight from Ootacamund	5538.8	
	Adam's Peak, north end of large basin, about 4½ miles down	4982.8	
	Giant's glen, about 5 miles down	4296.5	
	Tent mydan, about 5½ miles	4001	
	Bamboos begin hereabouts		
	Large nullah, bottom of ghaut	3408.9	
	Seegoor	3393.6	

It is much to be regretted that my friend Dr. Benza did not find his way down the new ghaut, for (beauty of scenery apart) the features of the country are most extraordinary, and well worthy the attention of one so capable of delighting both the scientific and general reader.

As Dr. Benza's narrative has frequently, to my knowledge, been adopted as a guide to travellers, and as on one occasion a party of five besides myself endeavoured in vain to find the "Devil's Gap" from the drawing thereof which accompanied his paper, owing to that faithful delineation being taken not from the road but from a point low down, I venture to send a rough sketch[*] of the Gap as seen from the route to Murraypett. The Gap alluded to is about two miles only from Murraypett Bungalow (not four as supposed by Dr. Benza), and is situated at a turn of the road immediately after descending rapidly from a high rocky bleak ridge, and at the entrance of a very remarkable narrow defile which leads to the Sispara range.

Camp Neilgherries, *July* 1, 1837.

VIII.—*Some Account of the New Colony of Western Australia, more especially of the Swan River District, the Natives, Settlers, Climate, Soil, Productions, &c.—By* William Milligan, *Esq.* M. D.—*Assistant Surgeon H. M. 63d Regiment—Staff Surgeon at Poonamallee.*

The new colony of Western Australia is situated on the western coast of New Holland, and extends from Cape Londonderry, in lat. 13° 44' south, to west Cape Howe, in lat. 33° 8' south, and Hertogs Island on the western coast in long. 112 ° 52 to 129 east longitude, reckoning from the meridian of Greenwich.

The Swan River district (the first settled, and as yet the most important) is situated in the great plain of Quartania, bounded on the north by the Swan river, lat. 32° 1½' long. 115° 40'; on the south by the Murray river, lat. 32° 33' long. 115° 44'; to the east by the Darling range of mountains, and to the west by the Indian Ocean.

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[*] We regret that we are unable to introduce a lithograph from this sketch, but we are necessarily obliged to be as economical as possible in our illustrations, and as a mere matter of topographical interest, we do not think one called for in this case. The sketch which accompanied Dr. Benza's memoir was intended to delineate the Gap as an interesting geological phenomenon. Captain Underwood's description will sufficiently indicate the true position, we think, for the guidance of travellers.—Editor.

Although I have called the Swan and Murray rivers the boundaries to the north and south as being fixed points, it would be more correct to say the country adjacent to these rivers, varying from one to four or five miles, the entire area being about fifty miles by thirty. Rottenest Island which is in front of the Swan river, was discovered by Vlaming in 1696.

The country is generally of the open forest description, in undulating plains, covered with a great profusion of trees, shrubs, and herbaceous plants, amongst the more important families of which are first the *Myrtaceæ* (Jussieu), comprising the *Eucalyptus*, and the guava, immediately related to it; these form nearly three-fourths of the forest. In this order we find the red gum tree *(Eucalyptus resinifera)*, the blue gum tree *(E. piperita)*, the brown gum tree or mahogany *(E. robusta)*, the white gum tree *(E. ——)*, the black butted gum tree *(E. ——)*, stringy bark tree *(E. ——)*; also the *Leptospermum*, *Callitris*, tea tree *(Melaleuca linarifolia)*, and others; these gum trees are found most useful for building purposes.

The second class in importance is the *Leguminosæ*, divisible into three principal families—the *Mimoseæ*, *Lomentaceæ* and *Papilionaceæ*. The *Mimoseæ* belong almost wholly to the genus *Acaciæ*, and are very generally diffused; amongst these are the black wattle tree *(Acacia melanoxylon)*, green wattle tree *(A. decurrens)*, and several other species. The *Papilionaceæ* include the *Gompholobium glaucescens*, and *Hovea rosmarinifolia*. The third class is the *Proteaceæ*, to which belong the *Banksia*, *Hakea*, and four species of *Grevillea*. 4th.—To the *Diosmeæ* (Brown) belong the *Boronia*, *Correa*, &c.—5th. *Dilleniaceæ* (Decandolle) different species of *Hibbertia*.—6th. The *Epacridiæ* (Brown) *Styphelea*, *Epacris*, three species.—7th. The *Compositæ* (Jussieu) *Aster*, *Bellis*, *Helichrysum albicans*.—8th. *Thymeleæ*, two species of *Pimelea* called *ligustrina* and *linoides*.—9th. *Solaneæ*, *Anthocercis albicans*.—10th. *Goodenoviæ*, several species.—11th. *Orchideæ*, several varieties; those which resemble the bee and butterfly are most admired—Umbelliferous plants and Filices. The more conspicuous plants and trees not belonging to any of these families, and which greatly contribute to give a character to the landscape, are a species of *Zanthorea*, or grass tree; a *Zamia*, or palm tree; three species of *Casuarina*, the she oak tree *(C. stricta)*, swamp oak tree *(C. paludosa)*, and forest oak tree *(C. torulosa)*; the latter make good shingles, and paling or fencing. The *Nutsya floribunda*, or cabbage tree, a singular plant, nearly confined to this part of the coast, and named after its discoverer; when in flower it much resembles the orange tree in full bearing. The *Anthistiria australis*, or kangaroo grass; *Mesembryanthemum officinale*, or Hottentot fig; and the *Anigozanthos* (several species), a beautiful plant, called by some the 'kangaroo's claw,' from the resemblance of its flower to the fore-foot of that animal.

The trees and shrubs which are evergreens, are a great ornament to the country, and furnish fuel to the inhabitants, shelter to the cattle, and the leaves manure to the soil.

Of the indigenous edible plants which were found most useful to the early settler, are the sow thistle *(Sonchus)* Hottentot fig, the young stem and pith of the grass tree *(Zanthorea)*, wild celery *(Apium prostratum)*,* wild carrots *(Daucus sylvester)*, a species of Orach *(Atriplex Halimus)*; and samphire *(Crithmum)*: these boiled with the salt provisions were a good substitute for spinach and other fresh vegetables. Of the edible fruits none were found deserving mention.

The soil is of three different kinds—1st, sandy—2d, alluvial—3d, red loam; the first is found near the coast, and, though unpromising in appearance, trees, shrubs, and grasses grow on it abundantly, and with the assistance of manure excellent esculent vegetables are obtained from it, as the valuable gardens in the farms of Perth and Freemantle sufficiently testify. The second or alluvial is in extensive flats, and produces admirable crops of wheat, barley, oats, &c., without any assistance from manure. The third, or red loam, which is met with on the high ground on the banks of the rivers, produces the same crops as the alluvial, but requires the assistance of manure.

There is a great deal of subterraneous moisture, which appears to be retained by a sub-soil of clay, which is to be met with at an average depth of five or six feet.

The mineral kingdom does not afford much variety; iron is abundant; mica and mica slate have been found at Kelmscott, and coal in the neighbourhood of King George's Sound. There is a blue clay of which bricks are made; calcarious rock is found along the coast; a ferruginous sandstone in several places; also soft grit,† or calcarious sandstone, which hardens on exposure to the air, and answers well for building purposes; in some situations shells and the roots of trees are found imbedded in it ; I have not observed the trunks of trees in it as mentioned by the French navigators. The Darling range of mountains, which rise about two thousand feet above the level of the sea, and are capped with fine evergreen mahogany, are chiefly granite, with some quartz. The cleaning of the ground and the tillage are not very laborious, but, from the high price of labour, an expensive work; oxen which cost from forty to fifty pounds per pair, and horses from fifty to one hundred and fifty each, are used in the ploughs; and farming is carried on in the English style, as far as practicable: the crops are sowed in May, June, July, and August, and sometimes so late as September, and reaped in December, January and February; the early crops succeed the best.

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* *Petroselinum prostratum*, De Cand.—Editor.

† M. Peron has attributed the great abundance of the modern breccia of New Holland, to the large proportion of calcarious matter, principally in the form of comminuted shells, which is diffused through the silicious sand of the shores in that country; and as the temperature, especially of the summer, is very high in that part of the coast where this rock has been principally found, the increased solution of carbonate of lime by the percolating water, may possibly render its formation more abundant there than in more temperate climates; but the true theory of these concretions, under any modification of temperature, is attended with considerable difficulty, and it is certain that the process is far from

Along the banks of the rivers may be seen fields of wheat, barley, oats, peas, potatoes, turnips, pumpkins, Indian wheat, &c. intermixed with fine pasture land. The sandy soil is covered with coarse herbage, on which cattle thrive remarkably well; on the good soil, about sixteen kinds of grasses are met with, amongst which the kangaroo grass is conspicuous. The gardens furnish most kind of edible vegetables in great abundance; some of which may be obtained at all seasons. Amongst these are cabbages, endive, beet, parsley, cresses,

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being confined to the warmer latitudes. Dr. Paris has given an account of a modern formation of sandstone on the northern coast of Cornwall, where a large surface is so covered with a calcarious sand that it becomes agglutinated into stone, which he considers as analogous to the rocks of Guadalope, and of which the specimens I have seen resemble those presented by Beaufort to the Geological Society from the shore at Rhodes. Dr. Paris ascribes the concretion not to the agency of the sea, nor to an excess of carbonic acid, but to the solution of carbonate of lime itself in water, and subsequent percolation through calcarious sand, the great hardness of the stone arising from the very sparing solubility of this carbonate, and consequently very gradual formation of the deposit. Dr. McCulloch describes calcarious concretions, found in banks of sand in Perthshire, which present a great variety of stalactitic forms, generally more or less complicated, and often exceedingly intricate and strange, and which appear to be analogous to those of King George's Sound and Severns Island, and he mentions as not unfrequently occurring in sand in different parts of England (the sand above the fossill bones of Norfolk is given as an example) long cylinders or tubes composed of sand agglutinated by carbonate of lime, or calcarious stalactite entangling sand, which, like the concretions of Madeira and those taken for corals at Bald Head, have been ranked improperly with organic remains. See King's Australia, appendix p. 595.—Swan river (Riviere des cygnes) upon this part of the coast, latitude 31—25 to 32, was examined by the French expedition. The rock in its neighbourhood consisted altogether of sandy and calcarious incrustations in horizontal beds, enclosing it is stated, shells and the roots and even trunks of trees.—Peron. vol. 1, p. 179—Freycinet, p. 5—170.

leeks, onions, radishes, carrots, nole-kole, parsnips, turnips, artichokes, vegetable marrow, and cauliflower; also cucumbers, pumpkins, water cresses, tomatos, cayenne pepper, and musk melon, rock melon, and water melon, in great plenty and perfection. The fruits now thriving are the grape, fig, peach, almond, apple, pear, strawberry, sloe, plum, several varieties; olive, the common and white mulberry, pine apple, plantain, sugar cane, Cape gooseberry; besides these, there are several others that will ripen here, which, in colder countries, never come to perfection; such as lemons, citrons, oranges; and much praise is due to that excellent botanist Mr. Drummond for being the first in succeeding to raise these fruits.

Of the animals I shall only mention such as are used for food, beginning with the fish, which are abundant, cheap and good. Among these are, king's fish; snapper (*sparus*); mullet (*mullus Malabaricus*); whiting (*eferianus*) skip-jack (*gasterosteus saltatrix*); flounder (*pleuronectes trichodactylus*); herring (*labrus*); sting ray (*raja pastenaca*); cobler (*platystacus*); crawfish, crabs, shrimps, oysters, muscle, &c.

Horned cattle, sheep, goats and pigs furnish the inhabitants with meat of prime quality, milk, butter and cheese. The pig was a most useful animal; it increased rapidly, and soon supplied fresh meat for the settler, a matter of great importance in the early period of the colony, in checking the scurvy; which disease became very general from the long continued use of salt meat. The domestic fowls are turkeys, ducks, geese, pigeons, and the common fowl.

In the words kangaroo (*macropus major*) brush kangaroo (*macropus elegans*), bandicoot and opossum (*petaurus*), were tolerably plentiful; as also the bustard (*otis tarda*); emeu (*Rhea Novæ Hollandiæ*); black swan (*cygnus atratus*); cockatoo (*psittacus galeritus* and *psittacus funereus*); bronze pigeon (*colomba chalcoptera*); wild duck (*anas fera*); quails (*coturnix*) parrot (*platycercus scapulatus*) parroquets, several kinds (*psittacus formosus*); birds of paradise (*scythrops psittacus*); swamp pheasant (*cuculus phasianus*); wattle bird (*merops*); snipes and several other small birds.

Three rivers intersect this spacious valley, viz. the Swan, the Canning, and the Murray. They are supposed to have their source in small streams in the Darling range of mountains, which unite, gradually increase in size, and run from east to west, in a tortuous direction, with a gentle current, into the sea; they are affected twice a day by the tides, which render the water brackish during the summer months, but it is fresh and fit for use at other seasons. They are shallow for the most part; in some places called the "flats" it is difficult at low water to get a boat over; the Swan is however navigable to vessels carrying three or four tons as far as Perth, that is, about twelve miles from the coast; the banks vary alternately on each side into hilly points and extensive flats, and are either sandy, alluvial or loamy, according to the tract of country they pass through. They are studded by trees, but neither the height of the banks, nor the number of trees, shade the water from free exposure to the sun and winds. Shoals of fish occasionally come up these rivers from the sea, and periodical floods occur after heavy rains, which overflow the banks and leave a deposit of alluvium on the low grounds; such a circumstance occurred in the winter of 1830. The fallen trees and stumps contribute much to increase these floods. Fresh water lagoons are numerous; there are also some containing salt water.

The water of the wells is abundant, and has the taste, odour, and transparence of the most perfect kind; it sparkles in the glass, and is found to answer to the utmost for all domestic purposes. It boils without leaving a sediment; is easily digested, excites the appetite, and may be drank freely without relaxing the stomach.

In the early period of the colony, there was some difficulty in finding good water along the coast, and in some other situations, but it was afterwards ascertained that it arose from the wells not having been made sufficiently deep. The water of some of the wells has still a darkish appearance, from not being properly cleared of roots of trees and other vegetable matter; in some places the water is impregnated with iron. In the government garden at Perth, there is a chalybeate spring which has been found useful in cases where a mild tonic is required. A small quantity of carbonic acid, carbonate of iron, and of muriate of soda, were found by analysis in this water; but I had not the means of ascertaining the exact proportions.

The strongst winds are from the north-west; the next in force from the south-west: the north wind is the hottest, and if long continued during the summer (which rarely happens) shrivels up vegetables and destroys their tender shoots. During the summer months there is a regular land and sea breeze, almost daily; the former of a morning from the east and north-east, the latter sets in about noon from the south and south-west; these winds render the intense heat of the sun less inconvenient and dangerous; the nights are cool, and the mornings and evenings agreeable. About 2 P. M. the thermometer begins to descend, and the air gradually becomes cooler. During the winter the winds from the north-west and south-west are sometimes very boisterous; two or three gales occur in each winter, and are so violent at times as to drive ships which happen to be in Gage's roads from their anchors. However, no such accidents have occurred in the harbour of Cockburn Sound, where ships ride in great safety at all seasons. The sky in summer is clear and of a beautiful azure, without cloud, and with very little rain; moderate dews descend after sunset. As the autumn approaches, the weather becomes less serene; the sky is occasionally darkened with clouds, and lightning and thunder with heavy showers occur. These rains are in sudden heavy showers, with intervals of fair weather and sunshine. As they come after a long scorching summer they are very acceptable and beneficial, for they mitigate the excessive heat of the air, and, softening the sun-burnt earth, render it capable of being cultivated. In winter it rains for the most part of two or three days together, then an interval of eight or ten days of fine weather takes place. In damp weather a fog is seen occasionally of a morning or evening rising from the valleys and borders of the rivers, and ascending to the high grounds. Hail of a large size, about an inch in diameter, is sometimes mixed with the rain; snow has not been seen once, and ice is rare, being only seen out of doors a few times in the morning during the winter; it soon disappears after sun rise. A fire is agreeable morning and evening in the winter and in wet weather, but on the whole rather a luxury than an absolute want. The winter is a season of flowers; the beautiful *Metrosideras, Styphelea, Hibbertia*, a sweet scented little plant, called May, *Oxylobium*, and others, bloom at this season; and, as the spring advances, a profusion of others succeed, amongst which the *Anigozanthos, Kennedya, Hakea, Hovea, Helichrysum, Orchidea, Drosera,* and *Thysanotus juncus*, or fringed violet, are conspicuous. The latter part of the spring is significantly termed by the natives, the "season of the yellow flowers," the meadows being enamelled with flowers of all colours, but the yellow predominating to a great degree.

Adjoining the Swan River district, and eastward of the Darling range of mountains, is an extensive tract of fine pasture land; the part at present settled is called Yorkshire; it is a cheerful country, well watered, covered with a short close herbage, free from underwood, and thinly timbered, and having a soil fit for raising all sorts of grain suitable to the climate. The merino and other breeds of sheep thrive well here; some of the wool has already been sent home, and brought a high price in the London market. Salt mines have been met with in this district, near the site of a town called Beverly.

After giving these hints on the natural history of the colony, I should proceed next in order to describe the manners and customs of the inhabitants.

In the month of June 1829, His Excellency Sir James Stirling, Governor and Commander in Chief, with the Civil Officers in the ship *Parmelia*, attended by His Majesty's Ship *Sulphur*, having on board a detachment of the 63d regiment, under the command of Captain Irwin, arrived and took possession of the colony. Soon afterwards, the settlers commenced to arrive, and continued to pour in rapidly, until the latter end of 1830; at which period the population amounted to about two thousand. The ships which carried them out bore a strong resemblance to Noah's ark, being crowded to excess with all manner of beasts, birds and plants, as well as men, women and children, and provisions. If we suppose the population of one of the agricultural parishes in England, with a sprinkling of half pay officers of the navy and army, some gentlemen from the East and West Indies, and a few cockneys, put down on the shores of a wilderness, it will give some idea of the individuals who were destined to become the founders of this interesting new Colony.

The settlers may be divided into two classes, viz. gentlemen and labourers, many of them married and having young families, others single. Amongst the former, were a large proportion of highly respectable individuals, who were accustomed to refined society, with the comforts and luxuries of life; amongst the latter, were some industrious, able and valuable servants, but with these were mixed up a large number of idle and worthless men, amongst whom drunkenness was a constant vice. Perhaps it will be expected that I should say something here of the soldiers, but I may not say with Cleghorn, it is a task I would rather avoid,—pudet hæc opprobria nobis, &c. To say the least, the leaven of good amongst them was in much greater proportion than amongst the lower classes of settlers; and the complimentary address, voted to the detachment by the respectable inhabitants on its quitting the colony, is a strong proof of their good conduct.

The first object of the settler in landing was to get up a temporary shelter for himself and those in his establishment; these were for a time of a wretched description. Some used single tents, which afforded but little protection from the heat of the sun by day, and the cold and winds by night. Others were accommodated in huts built of green wood, and pervious to every shower that fell; whilst many of the lower classes had no other awning day or night, than the canopy of heaven. After a little time, when the settlers got on their grants, buildings of a better description began to spring up. Some had wooden houses, which they brought out with them from London. Others had the same description of house made for them in the colony. Some erected houses of wattle and dab; that is, posts, about eight feet in height, erected at some distance from each other, and the intermediate spaces filled up with clay; to this was added a thatched roof and a chimney, which altogether formed a very comfortable dwelling. So soon as bricks could be made, or stone procured in sufficient quantity, good houses of such materials came into fashion.

During the first months of the colony, much anxiety was caused by the straying and loss of cattle in the bush, and by exposure to the weather of valuable plants and goods. Had any individual established a farm for the reception of cattle, and a ware-house to receive goods, it would have amply repaid him, and been the means of saving a vast deal of valuable stock and other property. No blame can attach to the government for want of arrangement on this head, as the settlers were apprized previous to leaving England, that they were to do every thing for themselves, and not to expect any assistance whatever from government. The zeal and activity, the kindness and attention, of Sir James Stirling, the Governor, in providing for all the wants and wishes of the people, so far as he had the means, were the theme of universal praise, and he was supported to the utmost by all his officers.

Travelling overland, or "travelling in the bush" as it is called, where neither roads nor houses were to be met with, though an interesting, was often a hazardous undertaking; but the danger did not arise from beasts of prey, none being met with in this country; but from the want of so simple a thing as a pocket compass. Being unprovided with this little instrument, was often the cause of many anxious hours as well as sleepless nights being passed in the bush. When the sun is clouded, so that one cannot guide his course by it, it is astonishing how readily you may go the wrong way; going a few yards out, will lead miles astray.

Things went on agreeably till about the beginning of the winter of 1830, when the supplies brought out from England, consisting chiefly of salt meat, biscuit and rum, became nearly exhausted; the crops which had been rather sanguinely calculated on, were scanty; provision reached a high price, owing to the irregularity of the supplies, and monopoly of the merchants; a dread of scarcity of food prevailed; much fatigue, anxiety and exposure to the weather, had been undergone, and, to fill up the measure of evils, a flood took place in the rivers after heavy rains, which caused them to rise from fifteen to twenty feet above their usual level. All who had commenced their buildings on the low ground were obliged to desert them, and commence anew on higher ground. Scurvy now set in, also fever and dysentery; these diseases were mostly confined to the working classes, amongst whom there was much disease and some mortality; whilst among the higher classes, who were, comparatively speaking, well provided with food and lodging, and among whom temperance was more practised, there was but little disease and no mortality. A fear of famine existed at three different periods. Ships, however, always happily arrived in good time to prevent any mischief; the crops in the second harvest were more abundant than the first, and have continued to increase every season, in such ratio as to satisfy every competent judge that the crops of succeeding seasons will be sufficient for the whole population, and render them altogether independent of supplies from without. As the settlers got comfortably housed, and obtained vegetables from their gardens, and fresh meat from the increasing flocks, the scurvy gradually gave way, and at length ceased altogether. The fevers became fewer, and of milder character, as the country became cleared and drained.

The endemic diseases appear to be a subacute form of inflammation of the mucous membranes, viz. opthalmia or inflammation of the mucous membrane of the eye; dysentery, or inflammation of the mucous membrane of the intestines, and catarrh, or inflammation or congestion of the mucous membrane of the nares and air passages. Rheumatism was occasionally met with during damp weather in winter and autumn; also a low fever, the gastero-enterite. Providence is here, as in all other places, good and wise, and supplies remedies on the spot for the diseases which occur. Thus we find the *hirudo medicinalis* abundant in the lagoons, a well known remedy in these diseases; also aperients, as the kernel of the fruit of *Zamia*, and the produce of the *Eucalyptus mannifera;* astringents, as the red gum of the *Eucalyptus resenifera* which much resembles dragons blood, and the bark of the wattle, particularly the green, or *Acacia decurrens*, which contain much tannin; aromatics, as the *Eucalyptus piperita*, and *Leptospermum*, pennyroyal, *Pulegium;* and diaphoretics, as *Sassafras*, *Cryptocarya glaucescens*. No doubt many other medicinal plants may be obtained. I do not mean to assert that the diseases of this country are always confined to the mucous membranes; on the contrary, I have known them occasionally affect the serous membranes, and also the solid viscera, but I conceive this to be the tissue generally attacked, and in which disease mostly commences; this, however, is only thrown out as a hint to future inquirers, which I do not much insist upon, my object being to record facts, rather than form hypotheses.

The exportable commodities which the soil and climate are capable of producing, are woods of various kinds, for cabinet use and for ship building, and shingles; the barks of several of the indigenous trees, especially that of the *mimosa*, containing tannin in a highly concentrated state; gums of various species and qualities, particularly gum arabic; salt of an excellent quality is found in Rottenest Island; salt-fish has been already exported to the Isle of France and India; seals, of the kind from which the fur is obtained, are very plentiful on the coast; —the seal fishery will open two sources of wealth to the colonists; the first being a trade in skins, the second in seal oil. The sperm and black whale fishery will afford articles of profitable export, and tend, also, to make the settlement important for the refitting and victualling of vessels engaged in the trade. Wheat and flour find a ready sale in the Isle of France; it is more favourably situated for that market than either Van Dieman's Land or Sydney. Fine wool has been already exported and approved of in the London market—hides, tallow, and horns; tobacco, wine, flax and hemp; cotton, almonds, aniseed, bees wax, and honey; barrilla, cheese for India and China, carraways, cochineal, coriander; dried fruit, such as figs, currants, raisins, and prunes; hops, vegetable oils, olives, citrons, oranges, lemons, &c. &c. to which may be added the very important article, silk.

Of the Aborigines or natives, I shall only say so much as occasional intercourse with them has enabled me to become personally acquainted with.

On the first meeting of the settlers with the natives, the latter seemed alarmed, and withdrew; after a little time, however, they gained more confidence, and a friendly intercourse became established; this continued for some months, during which time the natives occasionally rendered a little assistance in labour, for which they were rewarded with food, particularly bread, of which they became very fond. The propensity to thieving, inherent among the Swan River, as well as all other, savages, soon began to display itself; whenever an opportunity offered food and implements belonging to the settler were carried off; the lower classes would make no allowance for their large organ of acquisitiveness, and chastised them severely, whenever they discovered the theft. The natives, who appear to enjoy property in common, did not understand being punished for taking their neighbours' goods, and resented the insult. They attacked the houses of the settlers, generally of those living in isolated places, distant from the towns, plundered them, and sometimes murdered whomsoever they caught in the house. They also speared the cattle, and killed and carried away the sheep. In the rencontres which took place on these occasions, several black and eleven white men were killed, and a great many wounded. The government, anxious to put a stop to these atrocities, which endangered both life and property, offered a reward for the capture of Yagan, a supposed chief and ringleader. It was not long before this daring fellow, with two of his companions, were entrapped into a boat and made prisoners; they were sent to the island of Carmac, with an instructor, and two soldiers as a guard, for the purpose of being taught our language to interpret with their countrymen. After three weeks confinement, they rose one night, while the party in charge of them were asleep, seized a boat, and regained the main land and liberty. They were now forgiven, and with the rest of their tribe, became again on friendly terms with the settlers. Their genius for thieving could not, however, remain quiet; they were soon again discovered attempting to rob a store at Freemantle which contained provisions : the proprietor being alarmed got out of bed, fired on them, and shot one dead. Their rule in such cases being the *lex talionis,* they watched an opportunity for revenge. In a few days they observed a cart laden with provisions, and accompanied by two men, proceeding into the country ; they proceeded to a lonely place in the road, where the cart was to pass, and waited for it. On its arrival there, the men were attacked and both murdered. A gentleman rode up while they were in the act, fired two shots at them without effect, and identified the three principals, named Midgegoroo, Yagan and Monday. The government immediately offered a reward for their capture, dead or alive ; but the miscreants evaded search for some time; at length Midgegoroo was made prisoner by Captain Ellis, superintendent of native tribes, and a party of the 63d regiment, brought in and placed in the jail of Perth on the 16th of May 1833. He was tried and found guilty soon after, and was shot on the 24th of the same month. Not long after Yagan was met by a lad, the servant of a gentleman up the country, who shot him dead. Mercy was extended to Monday, who still lives and is the most daring of his tribe.

The severe and merited punishment inflicted on these unhappy individuals, has had a most salutary effect; the tribes have ever since conducted themselves peaceably, and are now on friendly terms with the inhabitants. It would seem to have been necessary to read them a severe lesson to teach them our superiority, and this could only be done by some summary punishment. The result proves that severity in the beginning is, in such cases, humanity in the end. It is to be hoped that these examples will be the means of preventing any further effusion of blood. The tribes are now under the care of superintendents, and daily receive rations from government. This arrangement, with moderate forbearance on the part of the settlers, will no doubt be the means of saving much property and preventing the waste of many useful lives.

The natives of western Australia are of middle stature, slender in limb, and many of them with a protuberant abdomen. The only article of dress is the waistband, or noodlebul, which is a long yarn of worsted, spun from the fur of the opossum, wound round the waist several hundred times; the cloak (booka), of kangaroo's skin, is worn chiefly by the women and old men, and occasionally, in the winter time, by the young men; they wear it as a mantle over the shoulders, fastened at the right shoulder with a rush (boerno). The large skins of the male kangaroo are appropriated to the women; the single men ornament their head with feathers, dogs' tails and other matters, and sometimes have the hair long and bound round the head, the women, who are mostly plainer than the men, use no ornaments and wear their hair quite short. Both sexes smear their faces and the upper part of the body with red pigment (wilgu), mixed with grease, which gives them a disagreeable odour. Their hair is frequently matted with the same pigment. When fresh painted all over, they are a brick dust colour, which gives them a most singular appearance. They have the same practice amongst them as at Sydney and King George's Sound, of cutting gashes on their body, and raising an elevated cicatrix: it is done chiefly on the shoulders and chest, and is both a distinguishing mark for different tribes, and an honorary distinction. The septum of the nose is also perforated, in which a feather or small bone is worn. Ornaments, however, are not considered as marking the man of authority, for they are worn by the young single men. Every individual of the tribe, when travelling or going to a distance from their encampment, carries a fire stick for the purpose of kindling light; and in winter they are scarcely ever without one under their cloaks for the sake of heat. It is generally a cane of *Banksia grandis*, which has the property of keeping ignited for a considerable time. Rotten bark or touchwood is also used for the same purpose. They are very careful to preserve this, and will even kindle a fire by friction, or otherwise, to revive it. Their weapons consist of spears of two or three kinds, which are propelled with a throwing stick (meero). They have also a knife (tapo), stone hammer (ugardee), and curl koileė, or curved flat weapon, similar to the bomerang of the New South Wales natives.

The spears (gudye) are made of a long slender stick, about the thickness of a finger, of a heavy tough quality, supposed to be the black wattle; they are scraped down to a very fine point, and are hardened and straightened by the assistance of fire. Those intended for hunting and fishing, called moongaul, are barbed with a piece of wood fastened on very neatly and firmly with kangaroo sinew (peat), and the ligature covered with gum obtained from the grass tree. They are about eight feet in length; the war spears are longer and heavier, and are armed, for five or six inches from the point, with pieces of sharp stones fixed in gum, resembling the teeth of a saw, the stones increasing in size, the smallest being at the point; glass has been substituted for the stones where broken bottles have been found; each man carries from two to five spears.

The throwing stick (miero) is about two feet long and four inches wide, narrowing at each extremity; at the handle is fixed a piece of gum (wank), in which is inserted a sharp edged stone (tannela), which is used to scrape the point of the spear when blunted by use. At the outer end of the mecro is a small wooden peg (picota), which is inserted into a hole at the end of the spear, and by which it is propelled. The miero is also used at close quarters in their fights.

The hammer (uguadu) is made with a lump of gum having two stones imbedded in it, stuck on to the extremity of a short stick; it is used in climbing trees, in throwing at and killing animals, in breaking down grass trees, and for the common purposes of axe and hammer.

The knife (tapo), is a stick with sharp edged stones fixed in a bed of gum, at the end and for two or three inches down the side, forming a serrated instrument. The koilee, or boomering, is seldom used as a weapon, but for skinning the kangaroo, and also for amusement; some are curiously carved.

Their wigwams (boorno) are merely composed of a few small twigs stuck in the ground, and bent over in the form of a bower, about four feet high and five or six wide. They thatch them slightly with the leaves of the grass tree; in rainy weather they are roofed with pieces of bark, upon which stones are placed to secure them from being blown away; but they afford a miserable protection from the weather. They are generally erected in a sheltered spot, near water, with the back towards the prevailing wind, and a fire is kept burning constantly in the front; one hut contains several individuals in a crowded state—the dogs, also, are admitted to a share of their bed. An encampment rarely consists of more than seven or eight huts; for, except during the hunting and fishing season, at which time large parties assemble together, their numbers are generally small, and two or three huts suffice. The number of individuals, however, seldom exceed fifty. The huts are so arranged as not to overlook each other; the single men have one to themselves, the children sleep with the women in a large hut near the husbands: these encampments generally consist of near relatives, and comprise families rather than tribes.

Those families who have locations on the sea coast, quit it during the winter for the interior, and the natives of the interior in like manner pay visits to the coasts during the fishing seasons. As the country does not abound in food, they are seldom stationary, removing, according to the time of year, to those parts which produce the articles of provision which may be in season. During the winter and early spring they are very much scattered, but as summer advances they assemble in greater numbers. It is at this season that they procure the greatest abundance of game; it is done by setting fire to the dry underwood and grass which rapidly burns. With a kind of torch, made of the dry leaves of the grass tree, they set fire to the sides of the covert, by which the game is inclosed and cannot escape. The hunters, concealed by the smoke, stand in the paths most frequented by the animals, and spear them with facility as they pass by. On these occasions vast numbers of animals are destroyed; the violence of the fire is frequently very great, and extends over many miles of the country, but this is generally guarded against by their burning it in consecutive portions. The women also kindle fires, but only for the purpose of taking bandicoots; they sometimes however, accompany the men at the larger firings for kangaroos or waleby. As soon as the fire has passed over the ground, they walk over the ashes in search of lizards and snakes, which are thus destroyed in great numbers, and those which have escaped their holes are easily discovered. In the chase the hunters are assisted by dogs, which they catch young and domesticate; but they take little pains to train them to any particular mode of hunting. In size and appearance they resemble our fox hounds; they appear to have a very fine scent, and draw upon their game like a pointer, after which they spring upon or chase it. When the owner does not wish the dog to follow, he ties the foreleg to the neck with a band of rushes, and leaves him in a shady place; he frequently carries the dog on his shoulders. They are excellent watch dogs, and will attack strangers; in the wild state they are sometimes killed by the natives, who eat their flesh, but of the skin no use is made. The mode in which they hunt the kangaroo is in small parties, or singly; they select a time when the rain is pouring heavily, or the wind blowing hard, to prevent the noise of their approach being heard, for the kangaroo is very quick in hearing, and always on the alert. The hunter creeps upon them with the greatest caution, and generally succeeds in approaching them unobserved. If possible they keep the wind in their face, and when one is observed, they take off their cloak, and when the animal stoops or turns his back upon them they hastily advance, keeping a bush between them for concealment. As they approach their prey, they move very lightly in a stooping posture, and only at the time when the noise of the wind prevents their footsteps being heard. Should the kangaroo turn round and observe them, they instantly stop and remain perfectly motionless until he resumes his feeding. In this way they approach within a few yards of their prey, and then pierce him with their spears; the instant he falls they run up and dispatch him with their hammers by blows on the head. The first operation is to extract the two front teeth of the lower jaw, which they use to sharpen spear points; then they seize the tail, and, taking the end in the mouth, bite off the tip, and by pulling, extract the sinews which are inserted in it; these are bound round a stick, and dried for use, either for the purpose of stitching the mantles or tying the barbs on the spears. Another mode of hunting the kangaroo, when huntsmen are numerous, is by surrounding and gradually approaching the game, until they get sufficiently near to spear them.

The emu is speared chiefly in the winter, at which time they lay their eggs; when a nest is found, the hunters conceal themselves behind a bush near it, and endeavour to secure the male bird first; the female they are pretty certain of, unless she has been disturbed, when she will forsake the nest. Emus however are not very often procured by the natives, but with them kangaroos are highly esteemed as articles of food; lizards also afford a favourite repast, and, at some seasons, form a considerable portion of their food; there are three species that are eaten. The snakes which are eaten by the natives are of several kinds; when the natives kill one they are careful to beat its head to pieces before they take it up; they then examine if it has recently eaten, and if it has indigested food in its stomach, they reject it; for, if eaten, they say it would cause violent vomiting. At the spring time of the year they live principally upon the eggs and young of birds, chiefly of the parrot tribe, but also of hawks, ducks, swans, pigeons, cockatoos, land turtle, &c. They are extremely expert at climbing trees, which they do by notching the bark with their hammers, in the ame manner as is practised in Port Jackson. Thus they procure opossums, which they trace to their holes by the marks of their claws upon the bark; there are two species, one the common ring-tail (uwarra), the other, comal: they are not often found in the same districts, the cernul living chiefly in lofty and thick woods, whilst the ring-tail is frequently found in swamps, and the low brush which surrounds them. The comal is of larger size and much lighter colour, with a brownish bushy tail; it is also fatter, the fur is longer, of a whitish colour, and is spun by the natives into a kind of worsted, called by them peteroe, of which the noodle buls are made; the fur of the ring-tailed opposum is not used. That of both species is easily detached from the skin. The comal is frequently hunted with dogs by moonlight, when it is either speared in its flight, or driven to its haunt in some hollow tree; the natives then make a hole, and extract it, but should it be too difficult or troublesome, they kindle a torch of grass-tree leaves and push it into the hole, when, in attempting to escape, the animal is easily taken.

During the summer and autumn months the natives derive a large proportion of their food from fish. They have no canoes, neither do they swim well. They have neither nets, nor hook and line, and the only weapon they use is the spear, with which they are very dexterous. In the mouths of streams they take large quantities by weirs made of bushes; but the most common method is pursuing the fish into shoal water and spearing them, or as they lie basking on the surface. Fish being very plentiful, they often kill more than is sufficient for present use; in this case they roast them, and, separating the flesh in large flakes from the bones, pack it carefully up in soft bark, in which way it will keep good for several days. Immediately on killing a large fish, they make a small opening just below the gills, through which they extract the entrails; if there be any fat, it is carefully separated; the bowels, liver, &c. they cook and eat. Although sharks are numerous, the natives are not at all alarmed at them; sometimes they will spear them, but never eat any part of the body. Sting-rays and maiden-rays are also common, but not eaten; though sometimes killed for amusement. Crawfish ("challons") and prawns, are to be obtained in the Swan river in some quantities, the natives roast them in the ashes and eat them. Frogs ("cooyah"), of two or three species, are eaten, chiefly at the season of their spawning. Grubs of different kinds are eaten raw or slightly roasted; the eggs of the ant also form an article of food. Of the vegetables on which they feed a few kinds only are known; the following, however, are more used than any other, and may be said to form the staple article of diet: boom, wyeing, matta and sudening bean boovulerang, a species of yam which they are very fond of; the boom are scarlet roots, not unlike in shape and size to tulip roots. They roast them in the ashes, and then pound them between two flat stones, rubbing the latter with a ball of earth to prevent the root adhering to it; when thus prepared they are mucilaginous and of a glossy black colour; they may be considered the bread of the natives who live near the coast. The wyang is of the tribe *orchideæ*; it is very pleasant eating when roasted. The matta is the small bulbous root of a rush; it is very fibrous, and only edible at one season; the roots of fern, sedge, and other plants, are also used as articles of food; also mushrooms of two species, and another kind of fungus. When the different species of banksia first come into bloom, they collect from the flowers a considerable quantity of honey, of which the natives are particularly fond, and gather large quantities of the flowers "monca" to suck; it is not, however, always to be procured: the best time is in the morning, when much dew is deposited on the ground; also in cloudy but not wet weather.

The natives at Swan river live upon the productions of nature, unassisted by art, varying at different seasons and in different districts; poor in quality, often scanty, and therefore compelling the natives to a vagrant life. The population consequently is far from numerous—they have no general chief, and associate and disperse as season or inclination leads them. Their wars appear to be more between individuals or families, than between tribes or districts. There are numerous subdivisions into tribes and classes, who appear to have little bond of union between them; the men go two or three together, unless they have some particular object in view; they are extremely jealous of their food, concealing and eating it silently and secretly; yet if others are present they usually give a small portion. When they are successful in hunting or fishing, they instantly make a fire, and eat a portion of their fish or game; the married men generally reserve a share for their wives. Of the children they appear to be very fond, and rarely chastise them; but their treatment of the women is not always so gentle, and many of them have spear wounds in the legs or thighs, inflicted by their husbands. The woman are very useful to them, not only in procuring food, but also in preparing their cloaks, building their huts, and other menial offices. They possess few utensils, and these are of the rudest construction; a piece of soft bark, tied at each end, serves for a drinking cup; the claw of a kangaroo they use for a needle, and through a hallow rush, or the wing bone of a bird (neveal), they suck the water, when it cannot be conveniently reached with their mouth. Polygamy is a general practice amongst them; one man sometimes having many wives. The girls appear to be at the disposal of the father, and are generally bespoke in their infancy; even before they are born we are told they were betrothed, if they prove to be females. The persons to whom the girls are betrothed are not unfrequently men of middle or advanced age, and possessing already several wives; they are, however, often more equally matched. Like those of other savage tribes, the women suffer little from child-bearing, and even the next day walk out to seek their food as usual. For the first few weeks the child is carried on the left arm in a fold of the cloak, but subsequently is suspended on the shoulders; until they can run alone, they are not clothed. In cases of twins one of the children is killed (of different sexes, the female being preserved), the reasons assigned for which measure are that a woman has not sufficient milk for two children, and cannot carry them and seek her food.

When individuals quarrel, it is taken up by their respective families; when a man is killed, his tribe instantly sets about revenging his death, but they are not particular whether they kill the principal offender or any other of his tribe. This feeling of retaliation is, however, extended much farther; for if a man be killed by accident, the friends of the deceased will impute his death to some bulgal (or doctor) of an adverse tribe, and kill an individual belonging to it in retaliation. Also when a man is seriously ill, and fancies he shall not recover, he will attempt to kill some body, in hopes thereby of recovering. In their personal conflicts, they use their hammers, throwing-sticks, and towks, to strike with, and the blows therewith inflicted would doubtless frequently be fatal, but they seem incapable of giving a heavy blow, and strike more like women. For depredations in each others grounds, or any slight cause, they are contented with spearing through the legs or thighs, and do not attempt to kill each other, and the moment one of the party is wounded the engagement ceases.

They have their doctors (bulgal) who attempt their cures by charms. On one occasion I witnessed the remedies applied for a sick child: the doctor inhaled the perfume of different plants, and then breathed into the mouth of the child; this was repeated several times; he also sat on the haunches like a monkey, and grinned most hideously at the child, jumping about occasionally, and repeating the grimace; he likewise rubbed his hand over the chest and stomach repeatedly, and snapped his fingers in the air. A native was one day writhing with pain on the ground in the barrack square; the bulgal approached him, and, with a piece of glass, cut from the angle to the symphisis of the chin on the right side. On looking into his mouth afterwards, to ascertain his disease, I saw a hollow tooth in the opposite side.

The diseases which they are chiefly subject to, are dysentry, opthalmia, catarrh and rheumatism, and these occur but seldom. Their poor diet, want of clothing, and the miserable huts they dwell in, will readily account for their suffering from vicissitudes of the weather which give rise to these diseases. It is only surprising that they are so remarkably healthy.*

Previous to entering upon a description of the weather, I shall first offer a few remarks on the topography of the town of Perth, where these observations were made.

Perth, the seat of government, is situated on the northern bank of the Swan river, eleven miles from Freemantle, on a gentle elevation, thirty feet above the level of the river, and about forty above the sea. It is bounded to the south by the Swan river, which is three quarters of a mile broad opposite the town; to the north by a string of fresh water lagoons, which are continuous up to the mountains; to the east by an extensive plain terminating at the Darling range of mountains twenty miles distant; and to the west by mount Eliya, which, running north and south, affords considerable protection from the strong gales coming from the north west and south west. The Swan and Canning rivers unite immediately below the town in a large estuary, called Melville water: this fine expanse of the meeting of the waters much resembles two large lakes running into each other. The sea breeze in reaching the town is further cooled down during the hot weather by crossing these waters. The soil is light, dry and sandy, with the exception of the banks of the river, which is alluvial. The substratum is sandstone; the water in the springs abundant and wholesome, in some places impregnated with iron. The principal streets are ninety-nine feet wide; one street runs about a mile in length, and is intersected at right angles by several others : the houses are built of brick and mortar and some of wood; they are placed on separate allotments, each ninety-nine feet wide and three hundred and ninety-six feet long, which are fenced in; a portion of the ground is generally converted into a garden; the gardens in front of the houses, and the large trees interspersed between, with the boats passing up and down the river, give the town a cheerful and picturesque appearance. The streets are not yet paved, but there is an agreeable walk along the bank of the river, and the rides about the town, along the bush roads to Guilford and Freemantle, are pleasant. Population three hundred.

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* For a full account of the natives of King George's Sound, see in Geographical Journal and King's Australia.

It may be said of Perth as Hippocrates formerly said of towns similarly situated, well exposed to the sun and winds and abundantly supplied with good water (De agre locis et aquis—Opera omnia, page 195), hæ minus a mutationibus temporum officiuntur: and diseases are less severe and less common here than in most other places.

I may also here mention Freemantle, the town second in importance, which is situated on the coast close to Gage's roads, on the southern bank of the Swan river, where it disembogues into the sea. The streets run at right angles, are sixty-six feet wide. The houses are built of a soft grit or calcarious sandstone, which hardens on exposure to the air, looks well, and is found in abundance in the neighbourhood. It is chiefly inhabited by merchants population about three hundred.

There are several other towns in progress, the most advanced of which is Guilford, situated about eight miles higher up the river than Perth, on a pleasant terrace, in an agreeable neighbourhood, where the soil is uniformly good.

These things being premised, I proceed to describe the most remarkable changes of the weather during the four years included in this notice.

Whenever the thermometer is mentioned, it is to be understood of a large mercurial one, graduated according to Fahrenheit's scale, kept in a proper place within doors (either in a wooden building or a thatched hut, with a southern aspect) except when I describe the sun rays, the intensity of which was measured by a smaller instrument of the same kind, hung out of doors, at some distance from the walls of the houses; no difference was observed between them, except that the mercury in the smallest was soonest affected by heat or cold, and consequently a little quicker in its motions, which occasioned it being found a degree or a degree and a half higher in summer and as much lower in winter, than the quicksilver in the larger thermometer. The difference between the heat of the air warmed by the direct rays of the sun, and that within doors was on an average 18 degrees; whenever it was remarkably greater, notice will be taken of it. The observations were made at 7 A. M., 2 P. M. and 7 P. M. The highest degree of heat generally occurred at 2 P. M., soon after which period, the sea breeze had fully set in at Perth, and the thermometer commenced to descend. The height of the thermometer at a medium is calculated from its average height at these different hours. The barometer was included in the same case with the thermometer, the whole made by Cary of London. It was occasionally heard that the barometer rose a little before wet weather, but this was an exception to the general rule. I regret the want of an hygrometer prevented upon me from ascertaining the exact dryness or humidity of the atmosphere; but this deficiency is in some measure supplied by the number of rainy days being noted, as well as by extracts from the register of the pluviameter kept by my friend A. Colin, Esq. Colonial Surgeon at Garden Island and Perth—for which see Table at the end.

1830, *March.*—Was fine for the most part, a little rain fell on the 11th, also on the 24th, at new moon; heavy rains on the 18th, lightning and thunder on 31st; prevalent winds E.—N. and N. E.

	Max.	Med.	Min.
Thermometer......	88	73¼	58
Barometer.........	30.30	30.05	29.80

April.—Early part cloudy and showery, middle fine, latter end cloudy; showers fell on 1st, 4th, 5th, 6th, 7th, 16th, 24th, 27th and 30th; lightning and thunder on 16th, 22d, 24th and 27th; winds N. W.—S. W. and N. E.

	Max.	Med.	Min.
Thermometer......	87	68¼	54
Barometer	30.30	29.95	29.60

May.—Fine till 13th, when some rain fell in the evening, preceded by thunder and lightning; on the 14th very loud thunder and lightning with much rain; on 15th (last quarter moon) 20th and 21st heavy rains; a gale of wind on 21st from the south-west, which did much mischief to the shipping in Gage's roads, light rains on the 22d, 23d, 24th, 25th 27th, 28th, 29th, 30th and 31st; winds N. W. and S. W.

	Max.	Med.	Min.
Thermometer......	84	63¾	45
Barometer	30.30	29.82¾	29.50

June.—Much rain with thunder on the 1st; it continued fine afterwards till 13th (last quarter of moon), on which day and 14th March rain fell; heavy rains on the 21st, 22d and 23d; slight rain on 27th; remainder fine. Hoar frost early in the mornings of 2d, 3d, and 4th; winds north-east, north-west and south-west.

	Max.	Med.	Min.
Thermometer......	70	55¾	40
Barometer..	30.15	29.82¾	29.50

July.—Heavy on the 1st, 2d, 4th, 5th, 6th, and 7th. Ice, the thickness of a shilling, out of doors, on mornings of 10th and 24th. It rained daily from 13th to 22d, with the exception of 19th, which was new moon. It also rained on 27th and 28th; lightning and thunder on 7th and 13th. Heavy squalls with hail stones, thunder and lightning, on 15th. Winds N. E.—N. W.—and S. W.

	Max.	Med.	Min.
Thermometer......	65	51½	34
Barometer.........	30.20	29.91¼	29.62½

August.—It rained much on fifteen different days viz. 4th to 10th, (last quarter of moon), 16th, 19th, 20th to 24th, and 31st, with squalls from north-west and south-west; remainder fine; prevalent wind S. W.

	Max.	Med.	Min.
Thermometer......	76	57¼	38
Barometer.........	30.35	30.07½	29.80

September.—Was warmer and drier than the preceding months, it rained on 1st, 2d, 9th, 14th and 19th. Winds N.—N. W.—and S. W.

	Max.	Med.	Min.
Thermometer......	80	59¼	44
Barometer.........	30.40	30.15	29.90

October.—Was fine with the exception of 1st, 2d, 7th, 8th, (last quarter of moon) 19th, 10th, 15th, 16th (new moon) 17th, 18th, 25th and 27th, on which days rain fell. Heavy squalls on the 9th; thunder and lightning on 10th, 17th and 18th. Winds N. E. and S. W.

	Max.	Med.	Min.		Max.	Med.	Min.
Therm.	78	62¼	46	Barom.	30.35	30.02¼	29.70

November.—Twelve fine days, twelve cloudy, six rainy, viz. 3d, 4th, 22d, 23d, 29th and 30th (full moon); much lightning and thunder on evening of 22d at first quarter of the moon; winds N. E. and S. W.

Therm.	93	71¼	54	Barom.	30.25	30.02¼	29.80

December.—Hot and dry, with the exception of 10th, 22d, 23d, 24th and 28th, on which days rain fell in slight showers. The thermometer at 103° in the shade, and 123° exposed to the sun's rays on 17th. Winds N.—N. E. and S. W.

Therm.	103	81½	62	Barom.	30.20	30.00	29.80

The prevalent diseases of this year were dysentery, opthalmia, fever, catarrhs and scurvy. A mild form of dysentery was the disease most commonly met with; cases have occurred in each month, but it prevailed most in April, after the weather began to break, with heavy rains, thunder and lightning: the medium range of the thermometer for the month being 68½, that of the barometer, 29.95.

1831.—The character of the seasons was, on the whole, milder in 1831, than in 1830; the winter more temperate, the rains more equally distributed through the seasons, and the winds more moderate. No severe gale occurred; during the summer the heat was less oppressive, and the medium range of the thermometer for the month of December five and a quarter degrees lower than the corresponding month of last year.

January.—Hot and dry, except on the 5th, 13th and 14th, when some slight showers fell, at the changes of the moon; the 22d, 23d and 24th were very sultry, the thermometer rose in the shade to 102°, 104, and 106 at 2 P. M. on these successive days; and when exposed to the sun to 123, 127 and 130. The wind was from the north the greater part of the month: this is the hot wind of the colony; while it prevails, the weather is very sultry.

Therm.	106	82¾	68	Barom.	30.10	29.91¼	29.72¾

Prevalent disease dysentery. During the month of February the regular land and sea breeze occurred almost daily; thunder and lightning on 7th, 12th, 13th and 14th, with rain on 7th and 14th. A few cases of ephemeral fever and rheumatism were met with.

	Max.	Med.	Min.		Max.	Med.	Min.
Therm.	102	80¼	62	Barom.	30.20	30.02¼	29.85

March.—Was generally fine; some showers fell on 27th and 28th at full moon; the land and sea breeze very regular. In the early part of the month slight opthalmia appeared, towards the latter end, dysentery and fever.

Therm.	96	76¼	56	Barom.	30.20	30.02¼	29.85

April.—Was fine for the greater part; the 10th, 29th and 30th cloudy and windy, with some rain; winds N. E. and S. W. The nights were cold. In the early part dysentery continued to prevail; about the middle and latter end scurvy.

Therm.	98	72¼	48	Barom.	30.25	30.10	29.95

May.—Was variable with heavy rains on 5th, 6th, 7th, 8th, 14th, 18th (first quarter of moon), 19th, 20th, 21st and 22d, and dew at night. Winds N. E.—N. and S. W. Scurvy and catarrhs most commonly met with; also a few cases of pneumonia.

Therm.	78	63¼	44	Barom.	30.40	30.15	29.70

June.—Was variable; the showers were frequent, but neither long continued nor heavy. Rain fell on 5th, 8th, 9th (new moon), 10th to 16th (first quarter), 17th, 21st, 22d and 23d; a severe thunder storm on the night of the 13th. Scurvy and catarrhs continued to prevail.

Therm.	70	58	38	Barom.	30.30	29.90	29.50

July.—Was fine with the exception of 4th, 5th, 6th, 7th, 8th, 15th, 16th (first quarter), 17th to 21st, 25th, 27th and 28th, on which days much rain fell. A severe thunder storm on the 8th, with a shower of hail. Ice was found out of doors about the thickness of a shilling on the morning of the 9th (new moon). Winds N. E.—N. W. and S. W. There was but little disease.

Therm.	67	54¼	53	Barom.	30.40	30.05	29.70

August.—A good deal of rain fell on 3d to 6th, 9th, 10th, 11th, 18th to 22d (full moon) 24th to 29th (last quarter). It blew very fresh on the 5th, but there was not any such severe gale as occurred last winter. Winds N. E. and S. W. Catarrhs sometimes met with.

Therm.	76	59¼	42	Barom.	30.40	30.10	29.80

September.—Thunder on 2d, 10th and 19th; mostly cloudy and showery on 2d, 3d, 4th, 7th, to 11th, 16th, 18th, 19th and 22d. Winds N. W.—S. W. and N. E. A few cases of ephemeral fever and catarrh.

	Max.	Med.	Min.		Max.	Med.	Min.
Therm.	78	62¼	45	Barom.	30.30	30.00	29.70

October.—Was cloudy and fine alternately; it rained on 7th to 13th (first quarter), 16th to 20th (full moon); remainder fine. Winds N. E. S. W. Catarrhs and ephemeral fever.

Therm.	79	63	48	Barom.	30.40	30.07¼	29.75

November.—Was squally and rainy at beginning; latter part fine. It rained on 3d, 4th, 5th, 6th, 8th, 9th, 18th, 19th (full moon), and 27th. During the early part no diseases; during the latter opthalmia. The 25th was very sultry. Thermometer in the shade at 95°; exposed to sun 130°. Winds W. and W. by S.

Therm.	95	69¾	54	Barom.	30.15	29.90¾	29.66

December.—Was generally fine, and cooler than the corresponding month of last year, the medium range of the thermometer for the month being 5¼ degrees lower; slight showers fell on 23d, 28th, 29th and 30th. Winds N. E. and S. W. The opthalmia which commenced in November continued throughout this month.

Therm.	96	76¼	60	Barom.	30.25	30.07½	29.90

The prevalent diseases of this year, were similar to those of the last, viz. dysentery, opthalmia, fever, catarrhs and scurvy.

1832.—The weather this year was more variable and damp than either of the two preceding; there were a greater number of rainy days, and the winds have been generally higher, though no severe gale has occurred.

January.—During the early part fine, the middle cloudy, latter fine; lightning on 4th and 6th, loud thunder on 31st; rain on 15th (full moon) and 31st. Winds N. E. and S. W. Ephemeral fever the prevalent disease.

Therm.	99	76¼	61	Barom.	30.10	29.95	29.80

February.—Fine with the exception of eight cloudy days, on three of which it rained, viz. 3d, 4th and 10th; thunder on 3d and 26th. Winds N. E. and S. W. Opthalmia prevalent.

Therm.	106	78¼	60	Barom.	30.10	29.97½	29.85

March.—Generally fine. Thunder on 4th, with heavy rains on 4th and 5th, and light rains on 6th, 19th and 30th. Winds N. E. and S. W. But little disease met with; a few cases of dysentery towards latter end.

	Max.	Med.	Min.		Max.	Med.	Min.
Therm.	95	77½	62	Barom.	30.20	29.90	29.60

April.—Was alternately cloudy, showery or fine, like April in England. It rained on 4th, 5th, 7th (first quarter of moon), 8th, 11th, 18th, 20th, 21st, 22d (last quarter of moon), 23d, 26th, 27th, 29th, 30th (new moon); a thunder storm on 8th. Winds N. E. and N. W. Dysentery the prevalent disease.

Therm.	92	71	50	Barom.	30.30	30.10	29.90

May.—Rain fell on 1st to 6th (first quarter of moon), 9th to 13th, 17th, 18th, 20th, 21st, 25th and 26th. A heavy squall from N. W. on 18th. Winds E. N. E. —N. W.—S. W. Rheumatism.

Therm.	77	61	46	Barom.	30.50	30.00	29.50

June.—It rained on 4th, 5th (first quarter of moon), 6th, 8th, 9th, 10th, 13th, to 17th, 21st to 25th. Hoarfrost and ice on 3d—a thunder storm, and large hail stones on 8th, with a heavy squall from S. W. Ephemeral fever.

Therm.	74	59	44	Barom.	30.60	30.20	29.80

July.—Was for the most part fine; it rained on 2d to 6th, 15th, 17th, 18th, 19th, 20th, 27th, 28th, 29th and 31st. Ice seen out of doors on mornings of 1st and 9th. Heavy squalls on 4th and 17th, attended by showers of large hail stones. Winds N. E.—N. W. and S. W. There was but little disease, chiefly catarrhs and rheumatism.

Therm.	70	55½	40	Barom.	30.35	29.97½	29.60

August.—Rain fell on the 1st, 4th, 8th, 12th, 18th (last quarter of moon), 19th, 23d, 29th, 30th and 31st; thunder storm on 11th. Heavy dew at night. Winds N. E. and S. W.

Therm.	79	59½	44	Barom.	30.30	29,97½	29.65

September.—Was cloudy, squally and rainy, much rain on 1st (first quarter of moon), and some on 2d, 3d, 4th, 6th, 7th, 12th, 13th, 14th, 15th, 18th, 20th, 21st, 22d, and 23d (new moon); thunder storm on 18th. Winds N. W. and S. W. Catarrhs, pleuritis and rheumatism.

Therm.	76	61½	50	Barom.	30.30	29.97½	29.65

October.—Was squally and showery during early part; the middle fine; latter end, squally and rainy. Ephemeral fever, with, derangement of the biliary system, and cholera morbus, the prevalent diseases. Some rain on 1st (first quarter of moon), 2d, 3d, 6th, 7th, 8th; much on 9th (full moon); some on 10th, 13th, 18th, 21st, 27th, 30th, and 31st (first quarter of moon).

	Max.	Med.	Min.		Max.	Med.	Min.
Therm.	76	62¼	50	Barom.	30.25	29.87½	29.53

November.—A thunder storm and gale of wind, with heavy rain, on 1st; cloudy, showery and rainy on 9th: thunder storm on 10th; cloudy and showery on 18th, 19th, 20th, 21st, 22d and 23d; remainder fine. Wind S. W. Disease opthalmia.

Therm.	86	64¼	52	Barom.	30.40	30.10	29.80

December.—Early part cloudy and showery, thunder storm on 4th middle fine, latter part squally and rainy, some rain on 1st to 5th, 10th, 30th and 31st. Winds N. E. and S. W. Cephalalgia and boils.

Therm.	101	75	60	Barom.	30.10	29.90	29.70

The total number of cases of disease have been about one-third less this year than the last, and nearly one half less than in 1830. The diseases most frequently met with have been fever, rheumatism, and opthalmia; occasionally catarrh and cynanche tonsillaris; dysentery but seldom, and scurvy has nearly disappeared.

1833.—The weather this year was variable and damp, though less so than the preceding.

January.—During the early part was cloudy, middle fine, except on 16th and 21st when there was thunder and heavy rains; latter end fine; nights cold and heavy dew. Winds S. W.—S. E. and N. E.

Therm.	99	77⅝	59	Barom.	30.20	30.00	29.80

February.—The early part cloudy and sultry, on 1st thermometer at 99° in the shade, exposed to the sun's rays 125°; middle fine, latter end cloudy; some rain fell on 8th, 14th, 27th and 28th; lightning and thunder on 14th, 18th and 26th. Winds S. W. and S. E.

Therm.	99	78	61	Barom.	30.20	30.00	29.80

March.—Fine till 6th, on which day there was lightning, thunder and some rain, thunder on 8th and 9th, much rain on 10th and 13th, showery on 10th and 23d, squally on 15th, 19th and 29th, remainder fine. Winds N. E.—N. W.—S. S. W.

	Max.	Med.	Min.		Max.	Med.	Min.
Therm.	94	73	54	Barom.	30.40	30.02¼	29.65

April.—Was alternately cloudy and fine, it rained on 2d, 7th and 24th. Heavy squall on 2d, hoarfrost of a morning at latter end. Winds N. E. and N. W.

Therm.	88	67½	50	Barom.	30.40	30.17	29.95

May.—It rained on 2d, 3d, 4th (full moon), 5th, 8th, 9th, 10th, 19th (new moon), 20th to 25th and 31st; heavy squalls on 10th from N. E.; remainder fine. Winds N. E. and N. W.

Therm.	79	64¼	46	Barom.	30.42½	30.06¼	29.70

June.—Much rain fell in this month, it rained on 2d (full moon), 3d 6th, 8th, 10th (last quarter of moon), 11th to 17th, 25th (full moon), to 30th; heavy squalls on 2d, from S. W. also squalls with thunder and lightning on 15th, 16th, 29th and 30th. Winds N. E.—N. W. and S. W.

Therm.	72	58½	40	Barom.	30.50	29.95	29.40

July.—Was very wet—it rained on 1st, 2d (full moon), to 5th, 9th to 12th, 14th, 16th, 18th, 22d, 24th (first quarter of moon), 25th to 29th, and 31st; hail on 3d; heavy squalls from N. W. on 18th, thunder and lightning; and thunder with heavy rains on 27th. Winds N. and N. W.

Therm.	70	59¼	47	Barom.	30.40	30.10	29.80

August.—Rain on 1st, 2d, 6th, 7th, 8th, 9th (last quarter of moon), 13th, 14th, 15th, 16th (new moon), 19th, 27th, 28th, 29th, 30th, (full moon) and 31st, a thunder storm with heavy rain on 6th, on morning of 9th, heavy squalls from N. W. with lightning, thunder, hail and rain. Winds S. W.—S. E. and N. E.

Therm.	74	58½	46	Barom.	30.45	30.07½	29.70

September.—Beginning fine, middle cloudy and showery, latter end fine, some rain fell on 7th (last quarter of moon), 9th, 10th, 13th, 18th, 20th; (first quarter of moon), 21st, 24th and 30th; thunder and lightning with heavy rains on 24th. Winds N. W. and S.W.

Therm.	78	60¾	50	Barom.	30.40	30.10	29.80

October.—Early part fine, middle cloudy and showery, latter alternately cloudy and fine, rain on 9th, 10th, 11th, 12th, 16th, 17th, 19th and 31st. Winds S. W.

	Max.	Med.	Min.		Max.	Med.	Min.
Therm.	88	66½	51	Barom.	30.25	30.07½	29.90

November.—Early part generally fine, middle cloudy and showery, and also latter end; rain on 8th, 14th, 18th, 20th, 21st, 23d, 24th, 26th, 27th (full moon), 28th and 29th; lightning on 14th, and lightning and thunder on 17th and 26th. Winds E. N. E. and S. W.

Therm.	91	70¾	54	Barom.	30.30	30.05	29.80

December.—Early part fine, middle cloudy and sultry, latter end fine; rain on 1st, 27th (full moon), 30th and 31st; lightning and thunder on 13th, 28th, 29th, 30th and 31st. Winds N.—N. E. and S. W.

Therm.	100	76	54	Barom.	30.30	30.05	29.80

The prevalent diseases of this year were catarrhs, hooping cough, and opthalmia; cases of fever, dysentery and rheumatism were also occasionally met with.

TABLE OF METEOROLOGICAL OBSERVATIONS.

Year 1830.	THERMOMETER.			BAROMETER.			No. of days on which any rain fell.	Quantity of rain.
	Max.	Med.	Min.	Max.	Med.	Min.		
January......	0	0	0	0	0	0	0	0.996
February......	0	0	0	0	0	0	0	0.394
March........	88	73½	58	30.30	30.05	29.80	3	0.729
April........	87	68½	54	30.30	29.95	29.60	9	1.087
May..........	84	63¾	45	30.15	29.82½	29.50	13	6.385
June.........	70	55½	40	30.15	29.82½	29.50	7	2.653
July.	65	51⅛	34	30.20	29.91¼	29.62½	17	9.091
August..	76	57¼	38	30.35	30.07½	29.80	15	5.280
September....	80	59¾	44	30.40	30.15	29.90	5	1.634
October.......	78	62¼	46	30.35	30.02½	29.70	12	3.030
November	93	71¼	54	30.25	30.02½	29.80	6	0.928
December	103	81½	62	30.20	30.00	29.80	5	0.005
Year 1831.								32.142
January......	106	82¾	68	30.10	29.91¼	29.72¼	3	
February......	102	80½	62	30.20	30.02½	29.85	2	
March........	96	76¾	56	30 20	30.02½	29.85	2	
April.	98	72½	48	30.25	30.10	29.95	3	
May......	78	63½	44	30.40	30.15	29.70	10	
June..........	70	58	38	30.30	29.90	29.50	14	
July..	67	54¼	33	30.40	30.05	29.70	15	
August........	76	59¼	42	30.40	30.10	29.80	18	
September....	78	62¼	45	30.30	30.00	29.70	12	
October.......	79	63	48	30.40	30.07½	29.75	11	
November	95	69¾	54	30.15	29.90½	29.66	9	
December	96	76¼	60	30.25	30.07½	29.90	4	

Meteorological Observations, continued.

YEAR 1832.	THERMOMETER.			BAROMETER.			No. of days on which any rain fell.	Quantity of rain.
	Max.	Med.	Mi.	Max.	Med.	Min.		
January......	99	76¼	61	30.10	29.95	29.80	2	
February......	106	78¾	60	30.10	29.97½	29.85	3	
March.........	95	77¾	62	30.20	29.90	29.60	5	
April.........	92	71	50	30.30	30.10	29.90	15	
May...........	77	61	46	30 50	30.00	29.50	17	
June..........	74	59	44	30.60	30.20	29.80	16	
July...........	70	55½	40	30.35	29.97½	29.60	14	
August........	79	59½	44	30.30	29.97½	29.65	10	
September....	76	61½	50	30.30	29.97½	29.65	15	
October.......	76	62¼	50	30.25	29.87½	29.50	14	
November.....	86	64½	52	30.40	30.10	29.80	9	
December.....	101	75	60	30.10	29.90	29.70	7	
YEAR 1833.								
January......	99	77⅛	59	30.20	30.00	29.80	2	0.004
February......	99	78	61	30.20	30.00	29.80	4	0.090
March........	94	73	54	30.40	30.02½	29 65	7	0.602
April.........	88	67½	50	30.40	30.17½	29.95	3	0.125
May...........	79	64¼	46	30.42½	30.06¼	29.70	15	4.025
June..........	72	58½	40	30.50	29.95	29.40	18	9.353
July...........	70	59¼	47	30.40	30.10	29.80	20	6.511
August	74	58⅛	46	30.45	30.07½	29.70	16	3.744
September....	78	60¾	50	30.40	30.10	29.80	9	1.405
October.......	88	66½	51	30.25	30.07½	29 90	8	0.546
November.....	91	70¾	54	30.30	30.05	29.80	11	0.354
December	100	76	54	30 30	30.05	29.80	4	0.076
								26 925

TABLE OF DEATHS, MARRIAGES, AND BIRTHS, AT PERTH.

YEAR 1830.		YEA 1831.		YEAR 1832		YEAR 1833.	
DEATHS.		DEATHS.		DEATHS.		DEATHS.	
Disease.	*No.*	*Disease.*	*No.*	*Disease.*	*No.*	*Disease.*	*No.*
Fever	14	Fever	3	Dysentery	1	Fever	1
Scurvy	13	Scurvy	3	Apoplexy	1	Dysentery	2
Dysentery	10	Dysentery	4	Drowned	1	Apoplexy	1
Dropsy	3	Epilepsy	1	Hanged himself	1	Excessive drinking	1
Apoplexy	1	Disease of heart	1			Pneumonia	2
Marasmus	4	Apoplexy	1			Consumption	2
Drowned	3	Marasmus	2			Hooping cough	1
Consumption	1	Convulsions	1			Thrush	1
Excessive drinking	1	Drowned	7			Croup	1
		Excessive drinking	1			Childbed	1
						Tabes mesenterica	1
Total	50		24		4		14

Total marriages at Perth, from 1830 to 1833 inclusive................32
Total baptisms at do. from 1830 to 1833 do. 130

TABLE OF DEATHS, MARRIAGES, AND BIRTHS, AT FREEMANTLE.

YEAR 1830.		YEAR 1831.		YEAR 1832.		YEAR 1833.	
DEATHS.		DEATHS.		DEATHS.		DEATHS.	
Disease.	*No.*	*Disease.*	*No.*	*Disease.*	*No.*	*Disease.*	*No.*
Dysentery	10	Scurvy	12	Apoplexy	2	Convulsions	2
Scurvy	10	Dysentery	3	Dysentery	1	Speared by natives	2
Consumption	1	Consumption	1	Scurvy	1		
Dropsy	1	Killed by natives.	1	Consumption	1		
Childbed	2			Cancer in womb	1		
Killed by natives.	1			Killed in a duel	1		
				Drowned	4		
				Hanged himself	1		
Total	25		17		12		4

Total marriages at Freemantle, from 1830 to 1833 inclusive..........21
Total baptisms at do. from 1830 to 1933 do. 24

I am indebted to the Rev. J. B. Wittenoom, the Colonial Chaplain, for the foregoing tables of deaths, marriages and births, which were copied from his Register. They will give some idea of the prevailing diseases and mortality for each year, with the gradual decrease of sickness as the colony advanced. These tables however can only be looked upon as an approximation to the truth, as in the early state of a new colony, it was difficult to obtain correct information in all cases. They include settlers, soldiers, women and children.

The Colonial hospital being at Perth, all the worst cases of disease amongst the poor were sent into it from all parts of the colony: consequently the deaths were more numerous there than at Freemantle.

IX.—*Account of the Construction and Operation of an Experimental Self-registering Barometer.*—*By* WM. GILCHRIST, *Esq. of the Madras Medical Establishment.*

In my communication respecting the Self-registering barometer published in No. 16 of the Journal, page 68, I mentioned with respect to the float which regulates the motion of the tube, that, "if this float "be sufficiently large to buoy up the tube, the balance part of the ap- "paratus may be laid aside altogether, and the weight below the cis- "tern, acting on the principle of *ballast*, will preserve the tube in the "perpendicular." I have fitted up a barometer on this principle. It has been in operation the last two days, and I have the pleasure to state that it proves most satisfactorily the correctness of the principle stated in the above quotation. I fear that a sketch of a plan of a barometer on this principle, could not be lithographed in time for the issue of No. 17, of the Journal now due, otherwise would send one. In the mean time, however, it will be satisfactory to those who wish well to the advancement of meteorology, to be informed that a barometer, of so simple a construction as the one alluded to, can be made, that will, with scientific correctness, make a perpetual record of the varying pressure of the atmosphere.

In fitting up the barometer referred to, I purposed merely to test the correctness of the principle, without reference to accuracy in the details of construction—in other words simply to ascertain whether the instrument would *work*. The tube portion consisted of a four-ounce glass stopper vial, by way of expanded top, cemented by means of bees' wax to a common barometer tube, the closed end of which was previously cut off. Presuming that those who interest themselves in meteorology would desire to test this principle, in the like easy manner, I will mention somewhat in detail the fitting up of the instrument, as otherwise one or two failures may occur before success be attained. In order to cement the vial and tube together, the mouth of the former and one end of the latter ought to be coated with melted wax—when cold, the tube is to be pushed about half an inch into the mouth of the vial and retained perpendicularly—then about four inches of the tube and one inch of the vial are to be coated with wax—applied in the fashion of paint—and when one is cold, successive coats are to be applied, until a body of wax has accumulated, sufficiently strong to keep the vial and tube firmly attached. It is essential to apply the wax coat after coat in the manner stated—as I found the applying it in the manner of *casting* did not make an air-tight joint. When the wax is quite cold, this tube is to be fitted into a piece of wood, in which a groove is cut to receive it—the vial part being received into a sort of cup formed in the expanded upper part of the wood. To the lower end of this, the float (also consisting of wood turned on a lathe to the requisite size) is to be attached; and through the middle of it the glass tube must descend to a level with the lower end. The wood and glass are attached by means of wax, and it is necessary to coat the float with the same, to prevent the mercury entering the pores of the wood.

About a foot above the float a cross piece of wood was fixed horizontally, and from either end of this a wooden rod descends about four feet—these rods ought to admit of being easily and firmly attached to, or removed from, the rest of the apparatus. They support the wooden shelf on which to place the weights which act as *ballast*, and it ought to be broad to admit of moving the weights into the position that will cause the whole instrument to float perpendicularly. The vial ought to be filled with mercury before the tube is cemented to it—however, this is not essential, as the mercury can easily be introduced down the tube—care must be taken, however, to incline the tube as the mercury rises in this, otherwise the great hydrostatic pressure may burst the vial. The cistern which holds the mercury may easily be made out of a common beer bottle, by cutting off the top narrow portion with a red hot iron. The upper part of the float is considerably smaller than the lower, with the view to admit of the indications being magnified.

Compared hourly with a common barometer, the two rose and fell simultaneously, but not regularly. This of course arose from the unequal diameter of the vial, and the irregular contour of the float—it was intended that the indications should be magnified five times—but at some hours the indications were greater, at others less, than those dimensions—this irregularity of course arose from the cause just mentioned—but, as already stated, all I contemplated, was merely to ascertain whether a barometer on this principle will work, which was proved most satisfactorily.

This instrument, compared with the balance variety, recommends itself for its great comparative simplicity of construction.

The plan of bringing the centre of gravity below the float, would be advantageously introduced in the variety of barometer shown by fig. 2, plate 15, in the 14th Number of this Journal.

Hoonsoor, 5*th October*, 1837.

X.—*Horary Meteorological Observations made at the Equinoxes and Solstices, agreeably with the suggestion of Sir* JOHN HERSCHEL.

1*st.*—*At the Trevandrum Observatory.*—*By* J. CALDECOTT, Esq.

Date.	Hour.	Bar. corrected for tempr. 32.	Thermometer.	Depress of W. B. therm.	Dew point.	Direction of wind.	Velocity of do	Solar radtn.	Clouds, aspect of the sky and remarks.
			°	°	°				
Sept. 21	6 A. M.	29.978	74.0	1.3	71.73	N N E ½ F	2.	—	Fl. cl. in zen.—light cum. about the horizon—fair—light air.
	7	29.993	75.5	1.0	74.09	do	1.	6.6	Zenith clear do do
	8	30.008	78.9	3.3	74.27	N N E	1.	4.5	do do do
	9	30.044	81.5	4.6	75.10	do	2.	9.6	Fl. light cls. in zen.—loose cum. about horizon.
	10	30.047	82.5	5.5	74.85	S W by W	2.	5.75	Heavy cum. dispersed—light air.
	11	30.029	83.5	7.0	73.68	S W	4.	4.65	do about N. & E.hor. gent. wind.
	Noon	30.001	84.5	7.8	73.57	S	5.	6.3	do do threatening—thunder from N.E.—heavy rain at half past twelve.
	1 P.M.	30.001	81.0	4.7	74.43	S by W	7.	Obscured.	Thunder and rain continued—squalls from S. by E.
	2	30.000	76.5	2.7	73.69	S E	4.		do. do.
	3	29.998	77.4	0.7	76.43	S S E	1.		Sky very cly.—wind hardly perceptible.
	4	29.992	77.9	1.9	75.25	do	4.		do. gentle wind.
	5	29.922	79.0	2.3	74.78	do	4		do. do.
	6	29.929	77.7	2.1	74.76	do	4.		Sky hazy do.
	7	29.950	76.9	1.5	74.80	do	3.		Zenith clear—horizon very hazy—gentle breeze—lightng. in E.
	8	29.981	76.2	1.3	74.37	do	3.		do cls. and lightning about the N. W. and E. horizon.
	9	29.992	75.5	1.3	73.65	do	1.		do. wind hardly perceptible.
	10	30.007	75.6	1.3	73.76	do	2.		do. do. do.
	11	30.005	75.3	1.3	73.45	do	2.		do. do. do.
	Midn.	30.004	75.0	1.4	73.00	do	2.		Sky very hazy—lightning. N.
22	1 A.M.	29.990	74.8	1.8	71.81	do	2.		Sky very cly.—wind just perceptible.
	2	29.976	74.5	1.5	72.34	do	2.		do. lightng. about S.E. horizon.
	3	29.959	74.0	1.7	71.53	do	2.		do. do. about E. horizon.
	4	29.954	74.0	1.8	71.48	do	2.		do. lightning from S. E.
	5	29.959	73.5	1.4	71.46	do	1.		Cum. and stratus dispersed—lightng. all round the horizon.
	6	29.979	73.8	1.2	71.97	do	1.		Overcast and threatening thunder from N. E.—wind hardly perceptible—rain at half past 6.
	7	29.998	74.0	0.9	72.10	do	2.	Obscured.	Rain continued--obscured--wind just perceptible.
	8	30.020	74.6	0.6	73.74	do	2.		Heavy cum. about the horizon—zenith very hazy—wind just perceptible.
	9								
	10	30.027	77.3	1.0	76.91	do	2.	2.4	do. do.
		30.028	80.0	4.3	73.96	do	1.	2.9	do. wind hardly perceptible.
	11	30.019	82.5	4.9	75.71	do	2.	3.1	Light cum. about the hor.—do.
	Noon	30.009	84.0	5.4	76.91	S by E	2.	7.8	Cum. dispersed in the zen.--wind just perceptible.
	1 P.M.	29.933	84.4	5.8	76.34	S by W	4.	9.6	Fl. cls. in zen.—cum. about the E. and N. horizon—thunder.
	2	29.932	82.9	5.5	75.27	S	4.		Sky very cloudy—gentle wind—drizzling rain and thunder.
	3	29.910	80.4	3.3	75.83	S	3.	Obscured.	do. threatng.—do.—thund. cont.
	4	29.926	80.5	3.5	75.65	S	3.		Nimbus in several parts—drizzling—thunder and lightning.
	5	29.927	80.5	3.7	75.37	S	4.		Lightning in the S. W. horizon.
	6	29.942	78.8	2.8	74.89	W	3.		do. do.

Fall of rain from 6 P. M. 20th to 6 A. M. 21st.. None.
do. 6 A. M. 21st to 6 P. M. 21st.. .7326
do. 6 P. M. 21st to 6 A. M. 22d.. .0042
do. 6 A. M. 22d to 6 P. M. 22d .. .1284
Total in 36 hours .8652 inches.

Instruments the same, and are placed in the same situation, as described before.

2d.—At Hoonsoor, in Mysore.—By Wm. Gilchrist, Esq. of the Madras Medical Establishment.

Day.	Hour.	Dry thermometer Fahrenheit.	Wet thermometer.	Barometer.	Winds.	Clouds, &c.	Remarks.
Sept. 21	6¼ A. M.	70	68	27.460	Calm	Zenith nearly clear—horizon cum-strati.	Heavy dew.
	7	71.75	68.5	.500	N. by E. light breeze	do. cumuli do. clear.	A rainbow on cloud near zenith.
	8	73.75	68.75	.520	N. E. by E. do	Thin cumuli and cirri over hemisphere.	
	9	76.25	69.5	.530	N. E. do	Cumuli over greater part of do.	
	10	78	69.5	.536	E. do	do. do. do.	The cumuli have ragged edges showing an electrical state.
	11	80.5	70	.536	N. E. do	Zenith cumuli—horizon all round cum-strati.	do. do. do.
	12	83	70	.510	E. by N. do	Detached large cumuli over hemisphere.	
	1 P. M.	86	71.5	.480	E. by N. breeze	do. do. do.	
	2	85	68	.462	do. do	do. do. do.	The cumuli ragged at edges.
	3	87	69.75	.444	E. do	do. do. do.	Cumuli as at 2.
	4	86.75	69	.424	E. by S. light do	Zenith detached cumuli. horizon cum-strati.	
	5	87	69	.414	N. E. breeze	do. do. do. do.	An upper and lower stratum of cloud; the latter highly electrical—rain to eastward.
	6	72.5	66.5	.424	S. W. light do	Nimbi.	5½ P. M. strong wind from E. with rain in large drops—6 P. M. wind suddenly changed to S. W. at first strong and puffy, afterwards light breeze.
	7	76.5	69	.414	Calm	Zenth clear—S. W. horizon nimbi.	7 P. M. lightning almost continuous in W. horizon—no thunder heard.
	8	74.5	69	.412	W. light breeze	Nimbi.	Heavy rain—thunder over head.
	9	74	70	.488	W. air	do.	
	10	74.5	70.5	.484	W. light breeze	Zenith clear—W. horizon dark cum-strati.	
	11	72	70	.464	W. air	do. do. a few cum-strati.	
	12	71	69.5	.470	W. do	do. do. do. do.	
22	1 A. M.	73.5	70	.484	W. do	Clear.	
	2	69.5	69	.462	W. do	Dense fog.	The fog supervened rather suddenly.
	3	69	68	.450	W. do	do.	
	4	68	67.5	.440	W. do	do.	

Day.	Hour.	Dry thermometer. Fahrenheit.	Wet thermometer.	Barometer.	Winds.	Clouds, &c.	Remarks.
Sept. 22	5	69	67	.450	Calm	Zenith clear, less fog around horizon.	
	6	70.25	68	.450	do	Fog.	
	7	71.5	67	.490	do	do.	
	8	70.25	66	.512	do	do.	
	9	74.5	70.5	.532	S. by E. light breeze ...	Zenith a few thin cumuli—horizon cum-strati.	
	10	76.5	71	.532	do do do	do. cumuli with ragged edges—horizon cum-strati.	
	11	79	72.5	.540	S. E. breeze...............	do. do. do. do. do ...	Shadow on horizontal plane 2.280 inches, the perpendicular wire being 6 inches long.
	12	81	70.5	.528	do do...............	do. do. do. do. do.	
	1 P. M.	82	69.5	.492	E. light breeze—puffy...	do. do. do. do. do.	
	2	84	68.75	.462	N. E. do do ...	do, clear—horizon cum-strati.	do. 3.450 inches.
	3	84.75	69.5	.440	do do do ...	do. do. do.	
	4	84.5	67.5	.442	S. E. do do ...	do. do. do.	
	5	84.25	68.25	.436	N.E. do	do. do. do.	
	6	81.5	68.25	.406	Calm	do. cirri—do. do.	

Total quantity of rain during the period of observations 0.6 inch. The instruments with which the above observations were made, are the same as those used in June last, so that the remarks respecting their position, relative correctness, &c., as given with the June observations in the 16th No. of this Journal, apply equally to the above.

☞ The absence of the Astronomer from Madras has caused the omission of the Madras hourly observations.—Editor.

XI.—*Monthly Abstract of the Daily Atmospherical Register, kept at Merkara in Coorg, from 1st June* 1836 *to* 31*st May* 1837.

	Mean ther.		Mean barometer at 10 A. M. corrected.	Mean of hygrometer at 10 A. M.					Total fall of rain.	Prevailing winds.	General Remarks.
	At 6 A. M.	At 10 A.M.		Wet bulb.	Diff.	Quantity of moisture.	Dryness.	Dew point.			
1336 June	62	68	25.980	19.1	1.6	226.4	45	17.2	20.84	W. N.W.	The monsoon was later than usual on setting in, and can hardly be said to have begun till the 19th. The quantity of rain also does not amount to half the fall in the corresponding month of last year. For a considerable portion of the month, the air has been so saturated with moisture, as to afford no indication by the hygrometer. The troops continue (as usual at this season) very healthy.
July	62	64.6	26.025			Saturated.			23.73	W. N.W.	The monsoon has continued without intermission during the month, and the weather has been most disagreeable, exercise being almost totally precluded. The troops are very healthy, out of the 12 cases in hospital, 9 are accidents.
August	60	63	26.020			Do.			24.74	W. N. W.	The monsoon has continued without intermission throughout the month, with almost constant rain or fog, and high winds, the air being intensely damp and the sun scarcely ever visible. The troops continue extremely healthy.
Sept.	62	67	26.075	17.2	1.6	205.4	33	15.6	7.02	W. N. W. N. N. W.	The monsoon continued, but with diminished violence, when the weather cleared up, and has since been fine and clear with occasional fogs, and a few thunder storms. The wind is drawing gradually round the northward, and the nights are becoming cold. A few cases of rheumatism and fever, among natives have presented themselves, attended with determination to the head and chest—this is usual in all changes of weather.
October	63	68	26.125	16.1	6.1	149.4	129.6	8.7	0.55	NW. NE.	The weather during this month has been unusually fine, dry and clear, with high cold winds from the N. E. so much so as to occasion apprehensions of a deficiency of water for cultivation—The number of cases of slight fever, and rheumatism among the natives has also, as usual in sudden changes of weather, considerably increased—but they are generally mild, and yield to the usual simple remedies.

Nov.	60	70	26.120	15	7.2	128	151	5.4	1.55	E. NE.	The north-east monsoon may be said to have almost failed in this quarter. The weather during the month, except a few casual showers, has been clear, dry and cold. Fevers are becoming less frequent, and the troops are in general healthy.
Dec.	58	70	26.180	12.2	7.8	97.6	154.4	1.5	0.07	NE.	The weather during the whole of this month, with the exception of two light showers, and occasional fogs, has been dry and clear, the mornings and evenings cold, with, towards the latter part, storms of wind from the E. and N. E. The troops continue very healthy—a few cases of rheumatism and fever of a slight description notwithstanding.
1837. January	56	69	26.175	11.6	7.2	98.9	139.5	0.3	None	NE.	The weather during the past month has been uniformly clear, cold and dry, with very high cold winds. The number of cases of fever has somewhat increased, with a tendency in some instances to congestion in the lungs.
F eb.	60	74	26.210	15	8.8	112	188.4	2.5	None	E. E. N. E	The weather throughout this month has been intensely dry, and latterly very warm. The season being more than 6 weeks earlier than usual, the scanty monsoon of last year now begins to be severely felt, causing drought all over the country. The troops continue healthy.
March	64	76	26.170	16.4	8.9	124	197	4.6	1.29	Variable.	The weather during this month has been unusually close and hot, at least 6 weeks in advance of the two preceding seasons—water very scarce in many places. A considerable number of cases of fever, with determination to the chest, occurred after the showers on the 5th and 6th; since which the troops have been as usual healthy.
April	65	78	26.130	18.3	9.3	139	218	7.2	0.21	Do.	This month has been warm and pleasant; but few showers have fallen, which is unusual at this season.
May	63	72	26.070	20	4.1	211	93	16.2	7.64	N. W WN. W.	The early part of the month was warm and close with a few heavy showers. The monsoon set in on the 25th (unusually early) with a heavy thunder storm, but as yet only a small quantity of rain has fallen. As usual at this season, slight fever and bowel complaint have been common among the followers and prisoners in the jail, but have not prevailed among the military.
General means.	61.25	69.91	26.106					Total rain 87.04			

Robert Baikie,
Surgeon, 36th Regt. N. I.

XII.—Selections.

1.—*On a portion of Dukhun, East Indies.—By Lieutenant-Colonel* W. H. Sykes, F. R. S. F. G. S. F. L. S.

My personal observation of Dukhun (Deccan) and Konkun (Concan)* is not confined to the boundaries laid down in the following geological memoir; but as the rock and mineral specimens remaining at present in my possession are from Dukhun only, I have not thought it proper to extend my details beyond the limits I here prescribe to myself, although I might venture to do so from notes taken at different periods, without exposing my accuracy to question. I will, however, in closing this paper, offer a few observations on the trap and other formations of India; the amazing extent of the former not appearing to have been appreciated hitherto in European geological works.

Boundaries.—My tract† is bounded on the west by the range of mountains usually denominated by Europeans the "Ghats," from a misinterpretation of the term *ghat*, which simply means a pass, the proper name of this range being the "Syhadree;" on the north by the Mool river, as far as Rahooreh; on the east by a direct line from Rahooreh to the city of Ahmednuggur, and subsequently on the north-east by the Seena river until its junction with the Beema river below Mundroop; on the south-east by a line from Mundroop to the celebrated city of Beejapoor; on the south by a line from Beejapoor, to the town of Meeruj; and from this place the boundary in the south-west is the Kristna and Quina rivers, to the hill fort of Wassota, situated in the ghats. The western boundary line extends, as the crow flies, about 144 miles; the northern 72 miles; eastern and north-eastern 159 miles; south-eastern 41 miles; southern 80 miles; and south-western 88 miles. Agreeably to observations made by myself and the officers of the revenue survey in Dukhun, the tract lies between the parallels of north latitude 16° 45' and 19° 27', and east longitude 73° 30' and 75° 53', and, roughly calculated, may be said to comprise an area of about 26,000 square miles.

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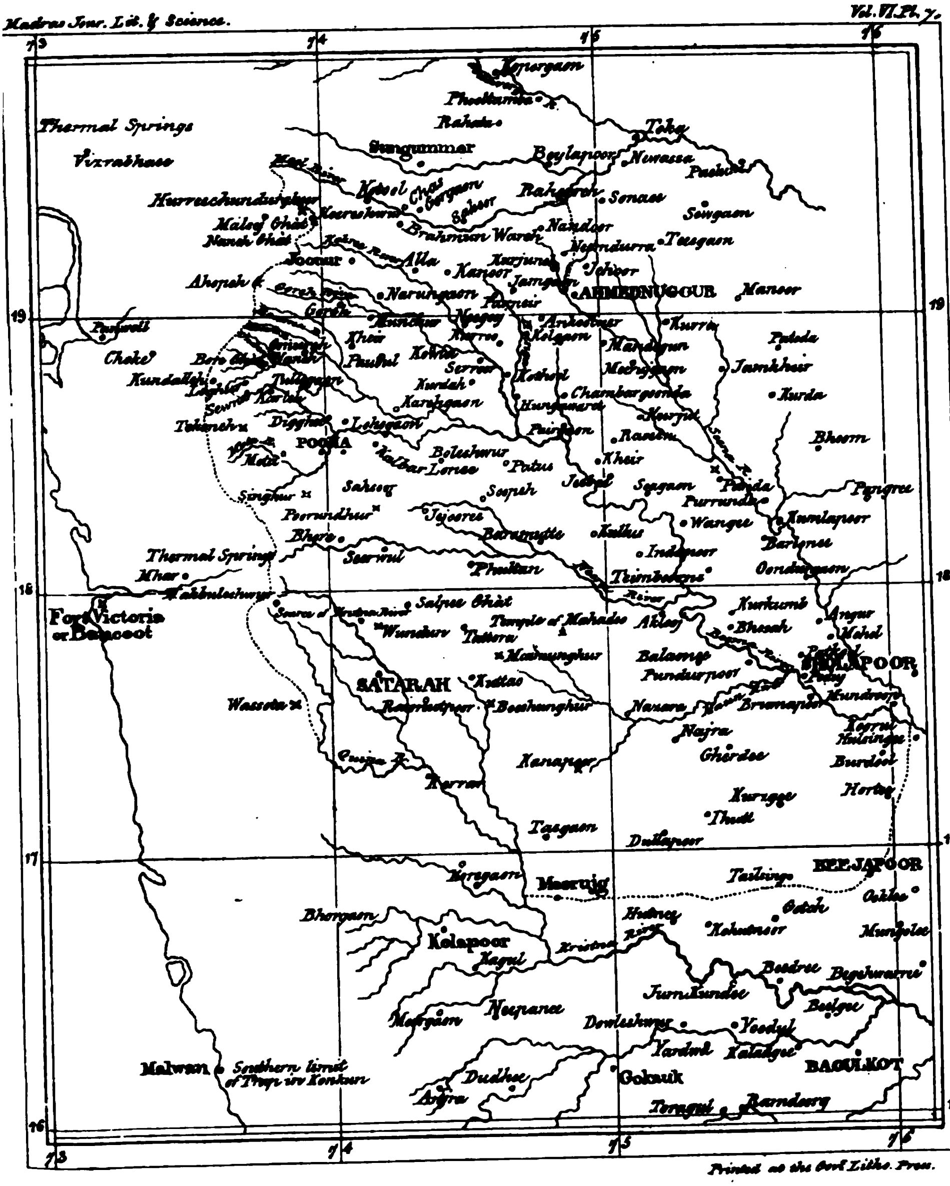
* With respect to the pronunciation of native words, the "u" is the u in "but," and he "a" the a in "*all.*"

† See Map, Plate 7.

Madras Jour. Lit. & Science. Vol. VI. Pl. 7.



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Ghats.—The Dukhun rises, by a succession of terraces or steps, very abruptly from the Konkun.[*] Its valleys and table-lands have a mean elevation above the sea of about 1800 feet. The Konkun is a long strip of land from thirty to fifty miles in breadth, lying between the ghats and the sea; the mean elevation of this strip is less than one hundred feet; but it is bristled with isolated hills, or short ranges, some of which attain an elevation equalling that of the ghats. Numerous shoulders or salient angles are thrown out from the ghats from the western or Konkun side, and by means of these the ascent to Dukhun is effected; with what difficulty, will be understood when I state that the military road of communication between Bombay and Poona, up the Bore ghat, rises nearly six hundred feet in a mile. The western portion of my tract along the crest of the ghats is exceedingly strong: spurs of different lengths extend from the main range to the eastward and south-east, leaving many narrow tortuous valleys between them, some of which have the character of gigantic cracks or fissures; other valleys, although occurring less frequently, when looked at from the neighbouring ranges, appear as flat and smooth as a billiard-table, even to the crest of the ghats, but when traversed are found to be cut up by numerous narrow and deep ravines.[†] Stupendous scarps, fearful chasms, numerous waterfalls, dense forests, and perennial verdure, complete the majesty and romantic interest of the vicinity of the ghats. As the spurs extend to the east and south-east they diminish in height, until they disappear on approaching the open plains in my eastern limits, between the Beema and Seena rivers. The area of the table land on their summit often exceeds that of the valley between them: such is the case with the spur bordering the left bank of the Beema river for forty miles from its source, occupying, in fact, the whole country between the sources of the Beema and Goreh rivers. The spurs are rarely tabular for their whole length, but narrow occasionally into ridges capped with compact basalt, and subsequently expand into extensive table-lands. The spur originating in the hill fort of Hurreechundurghur affords a good example. The fort is about eighteen miles in circumference: on the east it presents a salient angle to the neighbouring mountain; absolute contact, however, only commences at about four hundred feet from the top of the scarp, leaving

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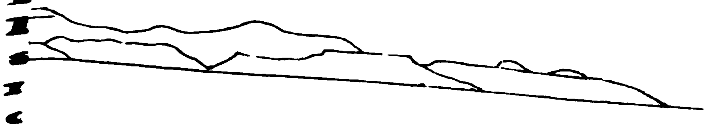
“ columnar in many places, and at Gawelghur it appears *stratified*; the summits of several
“ ravines presenting a continued stratum of many thousand yards in length.”—*Physical Class of the Asiatic Researches*, p. 189.

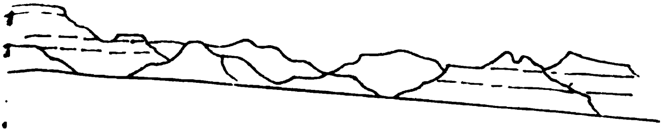
[*] See Plate 9.

[†] The valley of the Malsej ghat, for instance.

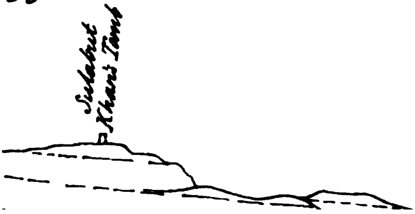
N. of the Town of Goreh.

lley of Joonur.





Ahmednuggur



a gap and an extremely narrow ridge, over which lies a difficult foot-path of communication between the valley of the Malsej ghat and that of the Mool river. The spur then widens; some lateral ramifications shoot out, on one of which is situated the fort of Koonjurghur ; at the Brahmun Wareh pass it narrows considerably, but not into a ridge ; it subsequently expands into the extensive and well-peopled table-land of Kanoor and Parneir, twenty-four miles long by twenty broad, having diminished in height, by a succession of steps, from 3894 feet in Hurreechundurghur to 2866 at Brahmun Wareh, 2474 at Parneir, and 2133 on the terrace of Ahmednuggur. From Ahmednuggur the spur bends southward until it is finally lost in the neighbourhood of Sholapoor. It is, in fact, the margin of a great plateau, which has a mean elevation of about three hundred feet above the valley of the Godavery river, and over which the rivers Goreh, Beema, Seena, &c., take their course. The basaltic caps of the ridges appear more or less columnar, from numerous vertical fissures ; the weathering of these exposed rocks produces pillars, spires, towers, houses, and other forms of works of art.* Another feature of these spurs is the occasional occurence on their table-lands of small hummocks or conical hills with a truncated apex. Dr. Voysey† mentions "groups of flattened summits and isolated conoidal frustra" in the Gawelghur trap mountains.

One of the longest of the spurs originates in the ghats north-west of Satarah, and runs nearly east-south-east, about one hundred and ten miles, towards Punderpoor.

The spur immediately south of Poona, on the ramifications of which are situated the formidable fortresses of Singhur (4162 feet), Poorundhur (4472 feet), and Wuzeerghur, adjoining Poorundhur (at nearly the same elevation), has an extent of ninety-five miles. The accompanying section, Plate xxviii. fig. 2. represents this spur.

Valleys.—Much having been said respecting valleys of excavation, I think it may be acceptable to offer a few observations on the valleys between the spurs. I shall describe only those that present the greatest contrasts to each other.

Valley of the Mota river.—The valley of the Mota river, south of Poona, originating in a mass of hills on the edge of the ghats, is so exceedingly narrow, that for some miles the bases of the opposite hills frequently touch each other, leaving, at intervals, little horizontal plots, of a pistol-shot in width. These plots occur in terraces, on lower levels as they extend eastward.

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* See plate 9, fig. 1 and 2 on the Konkun ; and Plate 8, fig. 1.

† Physical Class, Asiatic Researches, p. 189.

Vale of the Under.—The valley of the Under river, north-west of Poona, presents a perfect contrast to the last. It is level for twenty miles, running east and west to the very edge of the ghats, and a person can stand at the head of the valley upon the brink of a scarp rising almost from the Konkun. Here, at the source of the river, it is nearly six miles wide. The river Under runs down the valley one hundred and fifty feet below the level of the cultivated lands.

Vale of the Baum.—The neighbouring valley of the Baum river, unlike that of the Under, originates about seven miles from the crest of the ghats at a spot where the mountain masses separate into two spurs. Hence it continues level for fourteen miles, gradually widening eastward. The Baum river, like the Under, runs at a level of one hundred and fifty feet below the cultivated lands; these lands, in fact, being upon one terrace, the river upon a second and lower terrace.

Vale of the Beema.—The next valley on the north is that of the Beema river. The river rises on the elevated table-land above the ghats, at three thousand and ninety feet, and within the first few miles it tumbles over several terraces. The valley, for eighteen miles, is occasionally as narrow as that of the Mota river.

Vale of the Goreh.—Next on the north occurs the valley of the Goreh river, which, from the source of the river to Munchur (twenty-nine miles), is exceedingly narrow and tortuous. Here it expands into the broad horizontal plain of Kowta, ten miles wide.

Vale of the Malsej Ghat.—In conclusion, as a contrast to the first part of the Goreh valley, I must mention the valley of the Malsej ghat, on the south of the Dukhun-base of the fort of Hurreechundurghur. It is several miles wide, and literally as level, even to the brink of the ghats, as if smoothed by art. Many of the valleys of the ghats, particularly that of the Mool river, from the continued scarped character of the marginal mountains, and the flatness of the bottom for miles in extent, look like fosses to a Titan's fortress.

If all these valleys be valleys of excavation, the present rivers could scarcely produce such, were we to suppose their powers of attrition in operation from the origin of things even to the end of time!

Those of a fissure-like character might have resulted from the upheaving of the beds of trap from below the sea, and the consequent probable fracture of the surface; but the same explanation will not apply to those valleys associated with the preceding, broad, flat, and margined by scarped mountains, which valleys are as wide at their origin at the crest of the ghats, and at the sources of the rivers which run through them, as in any part of their length.

Terraces.—As the rise from the Konkun to the Dukhun is by terraces, so the declination of the country eastward from the ghats is by terraces; but these occur at much longer intervals, are much lower, particularly in the eastern parts, and escape the eye of the casual observer. In the neighbourhood of Munchur, on the Goreh river, there are five terraces rising above each other from the east to the west, so distinctly marked, that the parallelism of their planes, to each other and to the horizon, gives them the appearance of being artificial. An artificial character also pervades the form of many insulated hills: some of which viewed laterally, appear to have an extensive table-land on the summit, but seen endways look like truncated cones. Conoidal frustra in the Gawelghur range have been already noticed. Other insulated hills are triangular in their superficial planes, as the forts of Teekoneh(three-cornered) and Loghur.

Escarpments.—Stupendous escarpments are occasionally met with in the ghats. In these instances the numerous strata, instead of being arranged in steps, form a continuous wall. At the Ahopeh pass, at the source of the Goreh river, the wall or scarp is fully one thousand and five hundred feet high;* indeed, on the north-west face of the hill fort of Hurreechundurghur, the escarpment can scarcely be less than double that height. On the other hand, the steps are sometimes effaced, and a hill has a rapid slope. This originates in a succession of beds of the softer amygdaloids, without any basaltic interstratification; their superior angles disintegrate, and a slope results. But most usually three or four beds of amygdaloid are found between two strata of compact basalt; the former disintegrates, leaving a slope, which is not unfrequently covered with forest trees, forming a picturesque belt: the basaltic scarp remains entire, or it may be partially buried by the debris from the amygdaloids above; but its great thickness usually preserves it from obliteration, and it rises from the wood below with majestic effect, its black front being finely contrasted with the rich and lively green of its sylvan associate. It is these strata, arranged in slopes and scarps repeated three or four times, and so commonly met with in insulated and other mountains in Dukhun, that constitute the amazing strength of the hill forts of the country, leaving a succession of natural walls encircling a mountain. This feature did not escape the observation of Captain Dangerfield in Malwa, who says, "From the great difference in the resistance made to decomposition by these trap and amygdaloid beds, their exposed ends acquire a very distinct degree of inclination and character; the amygdaloid forming a great slope, and affording a loose mould covered with vegetation, the trap retaining its original perpendicularity and dark bareness."*

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* Plate 9, fig 1.

In the alternation of the strata there does not appear to be any uniformity; but the general level, thickness, and extent of a stratum are preserved, as in sedimentary rocks, on both sides of a valley; the basalt and hardest amygdaloids being traceable for miles in the parallel spurs or ranges; but the imbedded minerals, and even the texture, vary in very short distances.

Columnar Basalt.—A great geological feature of Dukhun is the occurrence of columnar basalt. The basalts and hardest amygdaloids run so much into each other that the line of separation is not always readily distinguishable, excepting of course the lines of horizontal stratification. I observed the prismatic disposition more marked and perfect in the basalt strata than in the amygdaloids, and the more or less perfect development of determinate forms was dependent on the compactness and limited constituents of the rocks. Basalts and amygdaloids, however compact, with many imbedded matters, rarely formed columns. Perfect columns were generally small, of four, five, or six sides; but the prismatic structure sometimes manifested itself in basaltic and amygdaloidal columns many feet in diameter. A bare mention of the places where they occur will testify to their extended localities.

On the low table-land of Kurdah, near Serroor, between sixty and seventy miles east from the ghats, columnar basalt occupies an area of many square miles. Small columns are seen in most of the slopes of the very narrow sinuous valleys of the flanks of the platform, and frequently the tops or terminal planes of columns are observed on the table-land forming a pavement. The perfect columns in the flanks are generally small, four, five, or six-sided, and rest on a stratum of basalt or amygdaloid. In some spots the columns are articulated, in others not. In a mass of columns in the face of the table-land towards Serroor the columns are of different lengths, but spring from the same level. More articulations having been washed from the outer columns than from the inner by monsoon torrents dashing over them, a pretty flight of steps remains. The columns of this table-land are from the most part erect, but sometimes stand at various angles, to the horizon, usually at 45°. In one instance, near the village of Kurdah, they lean from the east and west, towards a central upright mass: these are about fourteen feet in length, and are not articulated. In a mass of columns facing the west, and two miles south of the cavalry lines at Serroor, some are bent and not articulated; they are nevertheless associated with straight columns, which are articulated. At Karkullah thirty miles north-west of Poona, between Tellegaon and Loghur, a hill has been scarped for the great military road. Very numerous small columns occur in the escarpment, and they lie piled upon each other in a horizontal position; the only instance of the kind within my knowledge in Dukhun. Two or three hundred yards west of the village of Yewtee Purgunnah Kurdeh, in the rocky banks of a rivulet, imperfect columns are seen. On the right bank they are so marked, as to have excited the attention of the natives (an unusual event); and they are daubed with red lead, in the manner of Hindoo deities, and venerated.

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* Malcolm's Central India, Appendix, p. 322.

At Kothool, twenty-two miles south of Ahmednuggur, there is a thick stratum of close-grained gray homogeneous basalt in the face of the hill on which is seated the temple of Kundobah. Vertical and horizontal fissures are seen in the lateral plane or exposed edge of this stratum, but they are so far from each other as to leave huge blocks between them, giving the appearance of the superstratum of the hill being supported by massive articulated pilasters. Parts of the exposed edge are detached from its mass, leaving rude columns four or five feet in diameter, eight or ten high, and composed of three or four weighty stones disposed to assume geometrical forms. In the water-courses near Kurroos Turruf Ranjungaon, columns are observable. The basalt is bluish gray, compact, has a vitreous hue, and sharp fracture. The columns occur very abundantly in the slope of the hills, on either side of a very narrow valley running westward from the village of Ankoolner, Ahmednuggur collectorate. They are five or six-sided, articulated, and from a foot to two feet and a half in diameter, and of various lengths; the lateral planes perfect, but in some instances the sharpness of the angles has been affected by weathering. The texture is close-grained, colour almost black, and they affect the needle.

At Jehoor, near the source of the Seena river, in an insulated hill, an obscure columnar disposition is met with in a rock, in which in other places I had not seen the slightest trace of it. A stratum of red, cellular, amygdaloid fifteen feet thick, has subcolumns in its exposed edges eight or ten feet in diameter. In the banks of a water-course running into the Hunga river, half a mile east of Parneir, on the elevated table-land between the cities of Ahmednuggur and Joonur, basaltic columns are very numerous, they are five or six feet high, not articulated, and are not quite perpendicular. This formation is evidently extensive, as the ends of columns, chiefly pentangular, appear in the bed of the water-course for some distance, forming a pavement of geometrical slabs. The ends of columns of different lengths also appear in the southern bank at intervals, forming flights of steps. The basalt of which these columns are composed is very close-grained, almost black, with shining specks of a metallic lustre. The rocky banks of the Kokree river at Jambut, in the plain of Joonur, exhibit a strong inclination to a large columnar structure. In the hill fort of Singhur, at an elevation of 4162 feet, at the western end of the fort, there is a sheet of rock which has the appearance of a pavement of pentangular slabs. The slabs are no doubt the terminal planes of basaltic columns. The same is observed in the hill fort of Hurreechundurghur, about seventy miles north of Singhur; also in the bed of a water-course one mile north-east of Barlonee, near the fortress of Purrunda, 112 miles east-south-east of Singhur; and, lastly, in the bed of the Mool river at Gorgaon, Poona collectorate. These pavements extend to Malwa, as Captain Dangerfield mentions their occurrence in the beds of the Chumbul and Nerbuddah (Nermada) rivers.* The other localities of basaltic columns, or a marked disposition to this structure, were in a well at Kumlepoor, between the fortress of Purrunda and Barlonee, near the left bank of the Seena river; at Kheir Turruf Rasseen, in the face of a headland, abutting on the Beema river, on which the town stands; in the ascent to the temple of Boleshwur Turruf Sandus, Poona collectorate; and, finally, in the scarps of a mountain running down into the Konkun, and seen from the Naneh ghat, about three miles distant. Here the Giant's Causeway in Ireland is brought to mind; but the scale of the mountain is infinitely more magnificent, being fully 4000 feet high. There is a double row of columns, but from their inaccessible situation, I could only examine them through my telescope, and cannot testify, therefore, to their perfect development.

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* Malcolm's Central India, Appendix, pp. 329, 330.

Captain Dangerfield only once speaks of columns. They lie about a mile from the Nerbudda(Nermada), between Mundleysir and Mhysir, at 696 feet above the sea: they are either vertical or highly inclined. General Hardwick has published a lithographic sketch of them.* I have already stated that Dr. Voysey found columnar basalt in many places in the Gawelghur range.

Schistose structure.—Following the preceding formation, I may mention, that in some few places a schistose structure was met with; but its extent was limited to a few yards, the lamellæ were vertical, from an inch to three inches in thickness, being perfect tables, with parallel bounding planes. The rock in which this structure occurs, is a simple, indurated, gray clay, which flies into fragments under slight blows from the hammer. At Dytneh near Serroor some very perfect specimens have led the inhabitants to connect mystic influences with so artificial a development of inorganic matter. The spot is daubed with oil and red lead, and venerated.

Basalt en boules.—Another characteristic feature is the general diffusion of those rounded or oval masses of compact basalt, with concentric layers like the coats of an union, which the French geologists denominate "Basalt en boules," and ourselves, nodular basalt.

These concretions are usually found at the base of hills, buried in the debris from the decomposing strata; but in the Konkun, between Choke and Campolee (the latter at the foot of the Bore ghat), two villages on the high road between Bombay and Pocna, I met with them lying on the surface over a considerable area. They occur in a similar manner on the table-land of the ball-practice hill at Poona. At Koothool (already mentioned), in the slope of the hill, and in the debris at its base, and along the edge of the table-land near Paubul, they are abundant; but the finest specimens are seen near the village of Karkullah, thirty miles north-west of Poona, associated with horizontal basaltic columns. The hill has been cut away, to form the great military road. In making the escarpment, the balls were met with, and it being impossible to cut through the nuclei in vertical sections, it was either necessary to leave them projecting or to remove them altogether: in the latter case cavities remained equal to the hemispheres of the nuclei; and the vertical sections display from ten to fifteen concentric layers of friable gray stone, which in some instances I have found to affect the needle. I compared specimens of the nuclei with a mass brought by me from the Solfatara at Naples, and found them quite similar in aspect, colour, hardness, and great weight. This formation excited the attention of those gentlemen who have visited the northern and eastern parts of the great trap region;* but Dr. Voysey was quite mistaken in supposing it formed the basis of the western ghats. Captain Coulthard speaks of it in Sagar†. Major Franklin also noticed it in the trap of Sagar, in lat. 23° 51′, and long. 78° 44′, at 1933 feet above the sea, as " frequently globular; the nuclei " of the decaying masses, varying in size from an egg to a large bomb- " shell, and their decomposing concentric lamellæ being generally " very thin, and often very numerous."‡

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* Malcolm's Central India, Appendix, p. 323.

Dykes.—I now pass to the basaltic dykes, several of which came to my notice in different parts of the country. They are all vertical, and I did not observe that they occasioned any disturbance or dislocation in the strata of basalt and amygdaloid, through which they passed.

Two dykes run obliquely across the valley of Karleh (thirty-five miles north-west of Poona), and intersect each other: they are about four feet thick and cut amygdaloidal strata. A prismatic disposition is generally observable in the fracture, and from one of them I obtained a square prism, which lay at right angles to the walls of the dyke. The texture is compact. The military road running through this valley and down the Bore ghat to Panwell, is frequently crossed by ridges which I presume to be the outcrops of dykes. A dyke is seen on the southern slope of an insulated hill, near the villages of Bosree and Digghee, seven and a half miles north of Poona[*]. It is about four feet thick, has a transverse prismatic fracture, is compact, and runs from the bottom to the top of the hill; but it is not discoverable in the northern slope. It is visible from the cantonments at Poona. A similar dyke occurs in the hill at Ombreh, twenty miles north-north-west of Poona. But the most remarkable dyke runs vertically, from east to west, through the hill fort of Hurreechundurghur. It is first seen, of a thickness of six or seven feet, in the ascent of the mountain on the south-east from Keereshwur, about four-hundred feet below the crest of the scarp. The path of ascent into the fort is intersected by it, and its prismatic fracture, at right angles to its planes, offers a few available steps in the ascent. It is traceable for about three-hundred feet in perpendicular height. On the top of a mountain, within the fort, about a mile to the westward, it is discoverable at intervals, cutting through basaltic and amygdaloidal strata. I could not ascertain whether or not it appears in the western scarp of the mountain, the point to which it directs its course being wholly inaccessible.

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* Dr. Voysey says, " The nodular wacken or basalt is one of the most common forms " of trap in the extensive districts composed of the rocks of the family south of the " Nermada (Nerbuddah) river. It occurs perpetually in the extensive and lofty range of " mountains (the Gawalghur), situated between the Purna and Tapti rivers, and appears " to form their principal mass. It is found equally abundant throughout the whole of " Berar, part of the provinces of Hyderabad, Beder, and Sholapoor, and appears to form " the basis of the great western range of trap hills which separate the Konkun from the " interior of the Dukhun."—*Physical Class, Asiatic Researches*, pp. 126, 189.

† " The base of the hills is invariably broader than the summit; and if the sides of a " hill are smooth and even, *balled* trap, often a concentric lamellar variety will be the " principal component matter, decomposing and decomposed into a predominating work- " able clay, still showing the parallel converging layers."—*Physical Class, Asiatic Researches*, p. 78.

‡ Physical Class, Asiatic Researches, p. 30.

The gentlemen whose geological memoirs I have quoted, rarely advert to the subject of trap dykes, and their notices are very brief. Capt. Dangerfield says, " The trap of the southern boundary of Malwa " is much intersected by vertical veins of quartz, or narrow seams of a " more compact heavy basalt, which appears to radiate from cen- " tres."[†] Beyond the continuous trap region of the peninsula, Dr. Voysey notices a basaltic vein in sienite, near the Cavary river at Seringapatam, which must have been propelled upwards, as it broke through an oblique seam of hornblende in the sienite, and carried the pieces up above the level of the hornblende vein[‡]. " On the eastern coast," Mr. Calder says, " from Condapilli northward, the granite is " often penetrated and apparently heaved up by injected veins or " masses of trap, and dykes of greenstone."[§]

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[*] See Plate xxxiii. fig. 1.

[†] Malcolm's Central India, Appendix, p. 330.

[‡] Physical Class, Asiatic Researches, partI. p. 23.

[§] Ibid, part I. p. 10.

Ferruginous Clay.—The next distinctive feature is the occurrence of strata of red ochreous rock, in fact, MacCulloch's ferruginous clay underlying thick strata of basalt or amygdaloid, precisely as is seen to be the case in the Giant's Causeway in Ireland. It passes through every variety of texture, from pulverulent, friable, and indurated, to compact earthy jasper. The stratum is from an inch in thickness to many feet. The rock makes a red streak on paper, with the exception of the very indurated kinds, and does not affect the needle. It is pulverulent near the basaltic columns at Serroor, friable under sub-columnar red amygdaloid, near the source of the Seena river, indurated under basalt at Kothool. Although hard, it is here so cellular as to have the appearance of sponge, and reduced to powder, looks like brickdust.

In the scarps of the hill fort of Hurreechundurghur and a mountain near Joonur in which are excavated numerous Boodh cave temples, it is found compact and homogeneous, and is, in fact, an earthy jasper. In these localities it lies under from three-hundred to six-hundred feet of basalt. In the former locality it is about three feet thick, in the latter one foot. At Nandoor, north-north-west of Ahmednuggur, in the valley of the Godavery river, it is found as a porphyritic stratum, many feet in thickness, and is used as a building stone. The imbedded matter consists of very minute crytsals of lime. At Wangee, lying nearly in the latitude of Barlonee, but differing 18 miles in longitude, and at Barlonee it occurs as an earth: as both places lie on the same level, I have no doubt the stratum is continuous between them. It occurs abundantly in the ghats, frequently discolouring the rivulets, and giving a ferruginous character to the soil over a considerable area. When thin, andunder heavy beds of basalt or amygdaloid, the exposed edge of the stratum projects, is rounded, and double the thickness of the stratum itself; as if it had once been in a tenacious fluid state, and squeezed out by the superincumbent basalt; such is the case at Jehoor.

Pulverulent Limestone.—Limestone is met with, in the Dukhun, only in three states: pulverulent, nodular, and crystalline. The first occurs in thin seams on the banks of rivers and water-courses and at the base of hills in debris. The seams are from an inch to three feet in thickness, covered by a few feet of black earth. Sometimes in whiteness it resembles pounded chalk, and is then used by children to smear their writing boards.

In this state it occurs at Jehoor and Islampoor near Ahmednuggur.

At Kurkumb and at Salseh ten miles south of the fortress of Kurmaleh, it is met with under black earth in unusually thick strata, and of a peculiar whiteness. Major Franklin notices "a stratum of earthy limestone, white as chalk, at Sagar, occurring under a stratum of amorphous trap."*

Nodular Limestone.—The nodular limestone, which is the well-known kunkur† of India (*kunkur* being a native word for nodule), occurs, like the preceding, disseminated or diffused in the soil, and also on the surface. I have never seen the nodules of a regular crystalline form. They vary in size from a marble to a twelve-pound shot, and many of them are exceedingly irregular in shape, particularly those dug from the banks of rivers. They are sometimes obscurely lenticular. They are so abundant in certain localities that they appear as if showered upon the earth, and disguise its colour. Dr. Buchanan mentions the same in Rajmahl. When upon black soil, they are usually minute and tolerably uniform in size: on other soils their form is variable. In the ghats neither pulverulent nor nodular lime is met with. It is unnecessary to particularize the localities of the nodular kind, as it is of common occurrence eastward from the hilly tracts of the ghats, and is the only source of lime for mortar, a class of persons making a livelihood by collecting the larger nodules. When carefully burnt, they make an excellent cement. Captain Dangerfield describes, "the occurrence (in Malwa) in some parts, particularly near the bottom of the small hills, and banks of the rivulets, of a thin bed of loose marl or coarse earthy limestone."‡

Captain Coulthard says, "In Sagar a white patch of this limestone "mouldering by the weather is the source from whence comes the "particles of kunkur, mixed with the black basaltic earth of the neighbouring valley in such proportion as to add increased fertility to it; "and if a rivulet meanders through that valley (and such is generally "the fact) patches made up of aggregated particles of the same, will "here and there be found; and this it is which the native families pick "out and work into lime."§ Captain Coulthard refers the origin of the nodules to limestone rock underlying basaltic strata, but I cannot trace them to such a source, not having seen strata of compact limestone, properly so called, in the Dukhun. The only specimen of compact limestone met with by me was in the bed of the Beema river near Pundurpoor. It was an insulated, amorphous, gray mass, four or five feet in diameter. I looked upon it as an aggregation of the pulverulent particles of the lime disseminated in the neighbouring banks.

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* Physical Class, Asiatic Researches, part I, p. 30.

† The Mahratta word is not spelt with an "a." ‡ Malcolm's Central India, p. 328.

§ "Trap of the Sagar District," Physical Class, Asiatic Researches, p. 60.

Crystalline Limestone.—Lime in a crystalline state occurs only as an imbedded mineral in the amygdaloidal strata, in quartz geodes, and in the nucleus or compact part of masses of mesotype or stilbite. It is rare, compared with the preceding varieties.

Loose Stones.—Another feature of Dukhun is the occurrence of immense quantities of loose basalt stones, as if showered upon the land; also masses of rock heaped and piled into mounds, as if by the labour of man. Their partial distribution is not less remarkable than their abundance. For the most part, the stones have a disposition to a geometrical form, and it is by no means rare to meet with prisms of three or four sides and cubes almost perfect: stones with one or two perfect planes are very common. Their texture is close-grained and the colour verging to black.

At Dehwuree, Hungawaree, Behloondee, Kothool, and Dytneh in the Ahmednuggur collectorate, they are very abundant. At the last place they cover fields several acres in extent, so thickly that the black fertile soil on which they rest is not discoverable: they vary from an ounce to several pounds in weight. Amongst these I picked up a perfect square prism. In neighbouring fields, most unaccountably, there is not a stone to be seen: patches of sheet rock occur in their vicinity. Other localities are the top of the Neem Durra Ghat near Ahmednuggur; the junction of the Beema and Seena rivers below Mundroop; right bank of the Seena at Kurmaleh; between Kurjut and Meerujgaon; and generally it may be stated that the precipitous slopes of the low table-lands of the Desh (open or flat country) are very strong and rocky. For ten miles between Jeetee and Soagaon, Ahmednuggur collectorate, the fields, and even the road, are so thickly strewn with large basalt stones as to render cultivation difficult and travelling penible.

Rocky Heaps.—The singular heaps of rocks and stones above noticed occur at Kanoor, Patus, Kheir, between Kurjut and Meerujgaon, and at other places in the Desh, but not in the Mawals, or hilly tracts of the ghats. The heaps are from twenty to seventy feet in diameter, and the same in height: when composed of rocky masses without small stones, blocks of three or four feet in diameter and with a disposition to determinate forms, are piled upon each other, constituting rude pillars. In certain parts of the country from fifty to sixty of these heaps are seen within the area of a couple of square miles, and it excites surprise that the intermediate ground is destitute of stones.

Sheets of Rock.—Mention must not be omitted of the constant recurrence of sheets of rock of considerable extent at the surface and totally destitute of soil: this is particularly the case in the Mawals, or hilly tracts along the ghats. They abound with narrow vertical veins of quartz and chalcedony. When of sufficient thickness, the vein splits in the centre parallel to the surface of its walls, the interior being drusy with quartz crystals: the walls consist of layers of chalcedony, cachalong, hornstone, and semi-opal. These veins supply the majority of the siliceous minerals so abundantly strewed over Dukhun.

The localities where the sheets of rocks particularly struck me were Lakungaon, on the plain of Joonur, and generally in the valley of the Goreh river; at Kothool, Pergunneh Kurdeh; at Kheir and Raseen; in the hill fort of Hurreechundurghur; most markedly between Kooldurrun and Pairgaon on the Beema river. At Aklapoor, on the Mool river, they were very extensive; and at Angur, Mohol, Kurjut, and Patkool. Generally in the eastern and south-eastern parts of my tract, much decomposing amygdaloid is found at the surface of the low table-lands or terraces, which, in favourable monsoons, is equal to the support of Jowaree*; but a small deficiency in the rains occasions the destruction of the crop.

Structure and Mineral Composition of the Trap Rocks.—The structure and mineral composition of the trap rocks in Dukhun vary exceedingly in short distances, even in the same stratum; nevertheless, the predominant character does not disappear, although the basalt in a continuous bed may pass several times from close-grained, compact, and almost black, to gray, amygdaloidal, and external decomposing. The same observation applies to the amygdaloids. A variety of compact basalt,of an intense green colour, is susceptible of a brilliant polish, and rivals the celebrated Egyptian kind. It is of great weight and remarkable hardness: the natives use it to work into idols for their temples, pedestals to the wooden columns in their mansions, and slabs for inscriptions. The bulls of the size of life, always placed before temples of Mahadeo, are cut out of this variety at Raseen, Wurwund, and the renowned Boleshwur. Some of the pedestals in the gateway of the Mankeswur palace at Teimboornee look like mirrors. In the temple at Pooluj, south of Punderpoor, there is a slab six or seven feet long and two and a half broad, covered with an inscription in the Kanree language; and in Punderpoor the streets are paved apparently with the same basalt. At Jehoor and near Ahmednuggur is found a compact kind like the last, but not so heavy. It has a crystalline character and sharp fracture, and has angular siliceous pebbles imbedded: an occasional pebble is loose in its cell. In the Happy Valley near Ahmednuggur the basalt is compact and smooth, with reddish flat transparent crystals imbedded. It opposes a feeble resistance to the hammer, and flies into fragments, some of which have right angles. The basalt, even of the true columns, is not of a uniform texture in different localities: at times it is blackish or gray, and very small, granular or compact; at others, earthy and ferruginous, particularly externally. The basis of the amygdaloids is clay, with more or less hornblende disseminated: they embrace the cellular, porphyritic, hard, friable, and decomposing. I endeavoured to class them agreeably to the prevalence of quartz, chalcedony, lime, mesotype, or stilbite, as imbedded minerals, but found the method of very limited application. Sometimes one mineral only is imbedded, occasionally two, and often the whole.

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* *Andropogon Sorghum.*

In Hurreechundurghur quartz amygdaloid prevails: at Aklapoor on the Mool river it is characterized by mesotype, that mineral being imbedded in large masses, and the radii (six or seven inches) are the longest I have seen. At Nandoor it is porphyritic with minute crystalline specks of lime: near Ahmednuggur is seen a cellular, indeed spongiform kind, which is hard, and the cells are empty. A small cellular and pisiform variety is found in the wonderful cave temples of Ellora, and some of the sculptured figures appear as if marked by the smallpox. This observation is partially applicable to the Boodh and Hindoo cave temples of Elephanta, Salsette, Karleh, Joonur, the Naneh ghat, and the Adjunteh ghat; all of which are excavated in basaltic or amygdaloidal strata. The Stilbite or Heulandite amygdaloid is of very common occurrence; but the most prevalent kind is that in which all the minerals noticed above are associated. The stone usually selected for building is of various shades of gray or bluish gray; has hornblende disseminated in very small crystals;

works much easier than some of the compacter basalts, but takes a good polish. The entire temples of Koorul and Boleshwur, with their innumerable alto-relievo figures and laboured ornaments, are built of this variety of trap, which is, in fact, a greenstone, although less crystalline than the European rock. There is a variety selected carelessly, also used in building, which has the structure and nearly the external characters of the last, but which, in weathering, exfoliates, and the buildings fall to ruin; such is the case with the great temple in Hurreechundurghur.

I must not omit mention of two remarkable rocks which, as far as my reading extends, have not been noticed by authors on European geology. The first is an amygdaloid in which compact stilbite is imbedded in a vermicular form. One of its localities is the insulated hill on which stands the temple of Parwuttee in the city of Poona* ; and it is met with in many other places. Captain Dangerfield observed the same peculiar stratum near Sagar. He says, " There occurs an " amygdaloidal or prophyritic rock consisting of a compact basis of " wacké, in which are imbedded in great abundance small globular " or uniform masses, but more usually long *curved* cylindrical or " vermiform crystals of zeolite."†

The other rock occurs as a thick stratum of amygdaloid at the elevation of four thousand feet, in the hill forts of Hurreechundurghur and Poorundhur; and in the bed of the Goreh river at one thousand and eight hundred feet, near Serroor. The matrix resembles that of the other amygdaloids, but the mineral imbedded is a glassy felspar in tables resembling Cleavelandite, crossing each other at various angles, and so abundant as to occupy a moiety of the mass. I have only remarked it in the above localities, and it does not appear to have come under the notice of the gentlemen I have so often quoted in other parts of the peninsula.

Minerals.—Minerals are not uniformly dispersed in Dukhun. In one part quartz predominates, in another chalcedony ; and these are more or less associated with jaspers, agates, hornstones, heliotrope, and semi-opal or cachalong. In other places particular members of the zeolite family prevail, nearly to the exclusion of the siliceous class ; and elsewhere there is a diminution of minerals amounting almost to privation. Amethyst quartz is rare in Dukhun; when met with it constitutes the crystal, lining the interior of geodes of agate. I have not seen it in veins. Pseudomorphous quartz is common; the most frequent impression is that of rhomb spar. Lime occurs only in three crystalline forms: rhomb, dog-tooth, and the dodecahedron. The first is found on the surface, and imbedded in masses of quartz and compact mesotype; the two latter forms are associated with ichthyophthalmite in cavities in the amygdaloid strata*.

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* See Plate 9, fig. 2. near to the city of Poona.

† Central India, p. 338.

The following are a few of the mineral localities:—At Kothool, south of Ahmednuggur, the numerous quartz and chalcedony veins cover the country with agates, colourless quartz-crystals, and chalcedony; some of the specimens are fully a foot thick, including both walls of the vein. Here are met with some few crystals of calcarious spar inclosed in quartz. At Ahmednuggur, to the above siliceous minerals, some members of the zeolite family are to be added, principally stilbite. At Nandoor, on the plain of the Godavery river, the zeolites disappear, and the siliceous minerals are limited in number. On the contrary, at Jamgaon, eighteen miles west of Ahmednuggur, on the upper terrace or plateau, in addition to all the minerals enumerated, bits of yellow and red jasper and heliotrope occur. Ascending the Mool river from Nandoor, at Aklapoor, great masses of mesotype, with radii several inches long, are found imbedded in friable amygdaloid. North of Aklapoor, at Gorgaon, a new mineral occurs in a mass two feet in diameter. Its depth I do not know, as it lay partly buried in the amygdaloid bed of the river: its colour green, and breaking into rhombs. Gorgaon is the only locality known to me of this mineral. Its measurements are those of calcarious spar, but the specific gravity is less. It is stated to be coloured by green earth. It is interesting from being unknown in the cabinets in England.

A few miles further up the Mool river, at the village of Chas, in the shoulder of a hill formed of numerous thin horizontal beds of decomposing amygdaloid, many specimens of cloudy calcarious spar, imbedded in stilbite, are found, and the siliceous minerals are rare. Ascending to the source of the river the same scarcity prevails. Three miles south-south-west of Chas, at Brahmunwareh, great masses of stilbite, of the radiating foliate kind, are imbedded in hard amygdaloid. In the hill fort of Hurreechundurghur, although siliceous minerals are not abundant, crystallized quartz of various colours is seen, a feature not characterizing the Desh or open country. South of Ahmednuggur, as far as Soagaon on the Beema river, and Meerujgaon on the Seena river, the Ahmednuggur minerals prevail; hence descending the Beema to its junction with the Seena, a gradual diminution takes place, and at the junction they almost disappear; returning north, at Ashtee, between Kurkumb, and Mohol, a few are met with. At Oondurgaon, and up both banks of the Seena river to Purrunda, numerous and very fine specimens of milk opal, with a flame-coloured tinge in transmitted light, are found on the surface; and this is the only locality where I met with opal as a distinct mineral; and here the members of the zeolite family are very rare. At Tudwull, between Oondurgaon and Barlonee occur the only specimens of black calcarious spar seen by me in Dukhun; it is associated with transparent calcarious spar. In excavating wells in the cantonments at Poona, splendid specimens of ichthyophthalmite were brought to light; and generally in the bed of the river Mota-Mola and the neighbourhood, fine specimens of heliotrope and coloured quartz occur. The other minerals are *nadel-stein*, *analcime*, *chabasite*, and *laumonite*. Captain Dangerfield's details prove that the minerals of Malwa are identical with those of Dukhun.

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* That comparatively rare European mineral, ichthyophthalmite, is most abundant and of great beauty in the neighbourhood of Poona.

Natural Salts.—Only two kinds of natural salt came under my notice, namely, muriate and carbonate of soda.

With respect to the former, many of the wells at Ahmednuggur are brackish; and there is a rivulet running into the Seena river about two miles north-west of the city, which has its source a few miles distant, called the Salt Brook. It passes over a saliferous soil; and in its dry bed, or on insulated stones standing in its stream, are incrustations of common salt intimately mixed with carbonate of lime. No use is made of this salt. The saline impregnation of the soil extends to some distance west and north-west of Ahmednuggur, as I found a handsome well at Kurjooneh, eight miles distant, filled with water so brackish as not to be available for domestic use. At Wurgaon, between Kurjut and Pairgaon, a peculiar hoary appearance of a patch of ground in the midst of withered grass, led me to examine it. The whiteness was occasioned by lime in minute particles, mixed with a little muriate of soda.

The third locality of common salt was in the bed of a rivulet at Koond Mawlee, near the falls on the Kookree river, between Serroor and Kowta. A little common salt, with a trace of carbonate of soda, appeared, incrusting the rocky bed for a few feet near the water line. I did not observe common salt elsewhere. My attention was first directed to carbonate of soda at Serroor, by observing washermen digging for earth in the banks of a rivulet; learning that they used it to wash their clothes, I obtained a quantity; lixiviated the earth, boiled down the lixivium, and on cooling obtained a large crop of crystals, which the usual tests indicated to be carbonate of soda. I only met with one other bed, although I have no doubt they are numerous. At Kalbar Lonee, twelve miles east of Poona and two miles south of the Mota-Mola river, within an area of 200 yards, a constant moisture and partial absence of vegetation is observed. An efflorescent matter appears on the surface every morning, which is carefully swept up and sold to washermen: it is carbonate of soda. The occurrence of salts in the trap formation did not escape Captain Dangerfield's notice. He states that " the banks of the Nerbuddah (Nermada) near Mundleysir, consist of an upper thin bed of vegetable mould; a central bed, chiefly of indurated marle, strongly impregnated with muriate of soda; and a lower bed, of a reddish hue, with much carbonate of soda. In the dry season these salts form a thick efflorescence on the surface of the bank."* Saltpetre is manufactured in Dukhun, not from nitrated soils, but from the scrapings of old walls. I have also seen specimens of muriate of ammonia obtained by the brick and tile makers in burning dung, stable and other refuse matters in their kilns.

Ores.—No other ore than that of iron is found in Dukhun. It is only worked, to my knowledge, at Mahabuleshwur, at the source of the Krishna river. It occurs as a nodular hematite, associated, I understand (for I have not been at the spot myself), with laterite.† This ore produces the celebrated Wootz steel.

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* Malcolm's Central India, p. 324.

† This association of nodular *hæmatite* with *laterite* is sufficiently intelligible, when we recollect the manner in which the latter rock is very frequently formed, according to the undoubted testimony of Dr. Benza (see Madras Journal, No. 13, p. 255), viz. from the decomposition of the former. The distinguished geologist whom we have named, with true philosophical caution, forbore from giving the name of laterite to the decayed hæmatite of the Neilgherries and Northern Circars, because observation has not yet determined fully whether that peculiar mineral product " is a rock *per se*, or only the result of a modification in the structure of the metallic ore" ; or, as at the Red Hills near Madras, a conglomerate (Madras Journal No. 12, p. 110): he, therefore, termed the decayed hæmatite *lateritic iron ore*. That a very great proportion of the so-called laterite owes its origin to these two sources there is no doubt; and, to use the language of Dr. Benza, " it is a common mistake to apply the name to decomposed rocks of the primitive class, and to any other that have a red, ochreous colour, and softish consistence." Evidence appears to be still wanting to prove that it ever is found as a distinct formation; all the facts recently observed go to show that it is nothing but decomposed hæmatite, or other rock; or that it is a conglomerate.—Editor *Madras Journal*.

Organic Remains.—I did not meet with organic remains of any kind whatever. Captain Coulthard* in Sagar, Major Franklin in Bundelkand, and Captain Dangerfield in Malwa, were equally unsuccessful. Dr. Voysey, indeed, mentions a bed of freshwater shells in a stratum of indurated clay near the Tapty river in the Gawelghur hills; also at Medconta, two-thousand feet above the sea, on trap†; but these may have been recent, as he does not say to the contrary.‡ Mr. Calder, in his general observations on the geology of India,§ says, "But hitherto the most striking phœnomenon in Indian geology is the almost total absence of organic remains in the stratified rocks and in the diluvial soil." As this must have been written with a knowledge of Dr. Voysey's paper, it being in the same volume with his own, it is probable he considers the shells recent.||

Thermal Springs.—Thermal springs do not exist in Dukhun within my limits; but there are three distant localities in the Konkun below the ghats, where hot water gushes up from numerous crevices in trap rocks over an extensive surface.

The first is at Vizrabhaee, forty-eight miles north of Bombay, where the principal springs are in the bed of a river, and in the monsoon are consequently lost in the swollen stream; but in traversing the jungle in the vicinity I have met with detached pools of hot water, which are unaffected by the rains; their temperature is very high. The second

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* Physical Class, Asiatic Researches, p. 81.

† Mr. Malcolmson discovered extensive deposits of fossil shells and seeds of *charæ*, resting on granite and basalt, in the Sichel hills to the north of the Godavery river in the territory of Hyderabad (See Madras Journal, No. 12, p. 203). That gentleman's specimens collected in this locality, were sent home a considerable time ago, for examination by Mr. Lyell, from whom some account of them may shortly, it is hoped, be expected. Mr. Malcolmson's *Notes on the Geology of the country between Hyderabad and Nagpur*, may be studied in conjunction with Col. Sykes' Memoir, as they treat of tracts between the same parallels of latitude, the former commencing with the meridian of longitude where the latter leaves off.—Editor *Madras Journal.*

‡ Physical Class, Asiatic Researches, p. 194. § Ibid., p. 16.

|| It is necessary to observe that Colonel Sykes' Memoir, though published in the last volume of the Transactions of the Geological Society, was presented to that association so long ago as 23d January 1833. At the time it was written, therefore, the author was not aware of the extensive deposits of organic remains since discovered in several places in northern India. Thus, owing to the rare appearance of the bulky and costly volumes of this admirable Society, the communications when given to the world have lost their freshness and novelty, and, as in this instance, are behind hand in knowledge of recent discoveries. If the publication of its transactions is to be extensively useful for the advancement of geological science, the Society must descend from the dignity of a *quarto*, to the utilitarian system of *octavo* journals.—Editor *Madras Journal.*

locality is that mentioned by the late Dr. White, of the Bombay army. The hot wells are called Devakl Unei, and are fifty miles south-east from Surat,[*] at the foot of some hills; the temperature in the different springs ranges from 111° to 120° Fahr. They are spoken of as being in the vicinity of Anaval and Veval, but as these places agreeably to the map of India, are only thirty miles from Surat, there is evidently some mistake with regard to the distance. The third locality is at Mahr, on the Bancoot or Fort Victoria river, about seventy-five miles south of Bombay. I know of these springs only from report. The whole of the above springs, extending through 3° of latitude, lie nearly in the same parallel of longitude (73°), and are within twenty-five miles of the sea.

In a manuscript report to the government of Bombay, on the province of Khandeish, Colonel Briggs has the following passage testifying to the occurrence of thermal springs above the ghats :—

"Among the natural curiosities of Khandeish are the hot springs of the Satpoora hills, particularly those of Soonup Deo and Oonup Deo, the former in the district of Arrawud, and the latter in the deserted Pergunneh of Amba. The former is so hot that the hand cannot be borne in it; the latter is less ardent, and is used as a hot bath; they are both said to possess medicinal qualities, and are considered useful in the cure of cutaneous disorders,—amongst others leprosy."

Dr. Buchanan speaks of hot springs at Rishikunda and Bhimband in the trap mountains of Rajmahl;[†] and the Rev. Mr. Everest mentions a thermal spring associated with a trap bed at Katcamsan, between the 23d and 24th parallels of latitude, and longitude 86° and 87°[‡]. Dr. Adam mentions that of Sitakhund near Monghyr on the Ganges,[§] Dr. Davy speaks of one at Cannina,[||] Ceylon; and I am informed they are to be met with in Canara. Mr. Crow, formerly commercial agent of the Bombay government in Sinde, in his manuscript reports, mentions a thermal spring near Corachee on the Indus, of which the water is almost boiling hot. In Major Cruickshank's manuscript revenue map of part of Goojrat a hot spring is placed at Tooee, near Ruttenpoor on the Mhye river, in latitude north 22° 49′ and longitude east 73° 30′; and there is another at Lawsoondra, eighteen miles west-north-west of Tooee. These instances, which I am satisfied could be multiplied by diligent inquiry, afford ample proof of the wide occurrence in the peninsula of India of those singular phœnomena, the satisfactory explanation of the causes of which is still a desideratum in geology.[*]

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[*] Transactions of the Royal Asiatic Society, 1833.

[†] Gleanings of Science, vol. 1. p. 36.

[‡] Gleanings of Science, May 1831, p. 135.

[§] Geol. Trans., 1st Series, vol. v. p. 389.

[||] Geol. Trans., 1st Series, vol. v. p. 313.

Craters.—Volcanic products were not seen by me, nor any conformation of the hills that might be deemed an extinct crater; although the porcelain and ferruginous clays, and the exterior coat of the various quartz and jasper minerals indicate their having been exposed to igneous action. Captain Dangerfield did not meet with volcanic matters or craters in Malwa or the Vindhya range, but states a tradition exists of the celebrated city of Oogein, and eighty other places having been destroyed at a remote period by a shower of earth; and the people say that in the Vindhya range and Rajpeeply hills there are hollows near their summits "sometimes filled with water, which may be craters."[†] As the old city of Oogein stood upon a river constantly overflowing its banks, it was probably buried in alluvium. Mr. W. Hunter attributed its destruction to one of three causes,—earthquake, overflowing of the Seeprah, or drift earth by high winds; and, although the least probable of the three, inclines to drift earth. He states there are not any traces of volcanic agency in the buried city, nor in the neighbourhood.[‡] The remains of the city of Mhyair, on the banks of the Nerbuddeh (Nermada), are found in alluvium. We may safely say, therefore, there are not any indications of volcanic action of a comparatively recent date.[§]

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[*] See Mr. Malcolmson's account of the thermal springs of Kair, in No. 12 of this Journal, p. 212.—Editor *Madras Journal.*

[†] Malcolm's Central India, Appendix, p. 325.

[‡] Asiatic Researches, vol. vi. p. 39.

[§] The great lake of Lonar seems to possess the characters of a volcanic crater, according to the following account by Mr. Malcolmson:

"The Lonar lake is forty miles from Jaulnah. It is a vast crater nearly 500 feet deep, and four or five miles round on the upper margin. Its waters are green and bitter, supersaturated with alkaline carbonate, and containing *silex* in solution as well as some iron. The mud is black and abounded with sulphuretted hydrogen, but the water is pure and without smell. The rocks are volcanic, and springs of pure water rise out of the salt mud or stream down the sides of the punch bowl, thus strangely sunk in a nearly level country, there being but a gentle rise to the edge. The crystals of salt found at the bottom by the divers who remove it for purposes of commerce are tabular. Between this and the hot springs of *Kair* others are found, and the direction of the range corresponds with the dykes described by Voysey in the Hyderabad country."—*Journal of Asiatic Society of Bengal*, vol. 3d, p. 302.

A particular account of this very remarkable place, with specimens of the mineral productions of the vicinity, and of the water of the lake and its saline and other contents, would be very acceptable.—Editor *Madras Journal.*

Extent of Trap Region, &c.—I will now offer a few observations on the amazing extent of the trap, laterite, nodular limestone, granite, and gneiss formations in the peninsula, limiting their application to 25° of north latitude. My personal knowledge of the country extends from the sea on the western side, to Arungabad, in 75° 33', and Sholapoor, 75° 53' east longitude; north, nearly to Kandeish, and south, to Beejapoor and the Kristna river. Captain Dangerfield takes up the country on the north, nearly where my knowledge of it terminates, and says, "It (Malwa, including the Vindhya range) appears to constitute the northern termination of a very extensive secondary trap formation, which extends from the extremity of the Dukhun, and probably even Mysore, forming all the country above the ghats, and part of the plains below, on the western side of the peninsula, including the islands of Bombay, Salsette, Elephanta, &c."[*] He carries the continuous trap north to Neemutch, in latitude 24° 27', at 1476 feet above the sea. Its western limit is at Dohud, longitude 74°. Major Franklin and Captain Coulthard take it up in the eastern limits of Malwa, and trace it through Sagar; and it continues to an unknown extent towards Sohagpoor and the source of the Nerbuddeh river, on the table-land of Amarakantah, in longitude 82° east. Dr. Voysey describes its eastern limits at Nagpoor, latitude 21° 10' N., and longitude 79° 14' E. at 1000 feet above the sea. Mr. Calder states it passes from Nagpoor southward by the confines of Hyderabad, as low as the 15th degree of latitude, and taking a north-west direction terminates on the sea-coast at Bancoot or Fort Victoria, in latitude 18°. But specimens of rock shown to me from the Kolapoor country above the ghats, between the parallels of latitude 16° and 17° N., bear testimony to the trap extending nearly a degree and a half further south along the ghats than Mr. Calder supposed. Indeed its southern limit in the Konkun, Mr. Fraser states to be at Malwan, fifty miles north of Goa.[†] From the above evidence we have proofs of a continuous trap formation covering an area of from 200,000, to 250,000 square miles, a phœnomenon unexampled in any other country whose geological structure has been examined. It appears to me, however, that the above are not the absolute limits of the trap. Dr. Buchanan[‡] and Mr. Jones[§] describe the

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[*] Malcolm's Central India, Appendix, p. 320.

[†] Geological Transactions, 2d Series, part I. p. 153.

[‡] Gleanings of Science, vol. iii. January, 1831, p. 1.

[§] Physical Class, Asiatic Researches, p. 165.

Rajmahl hills in latitude 25° and longitude 88° to 89° E. as trap; the latter says the basalt is of amazing thickness. The Rev. Mr. Everest,[*] in a journey from Calcutta to Ghazipoor, passed four distinct broad beds of trap between the parallels of north latitude 23° and 24°, and longitude 84° and 87°. He states these beds to have an inclination to a common axis, and he thinks it probable they are connected beneath the granite and gneiss. Mr. Royle travelling the same route, observed the same beds. Mr. Everest's diagram shows their longitudinal axis on a line between the Rajmahl hills and the sources of the Nerbuddeh and Soan rivers; and as the trap of the Vindhya range and Sagar extends towards these sources, it is very probable the ramifications are connected with the beds (seen by Mr. Everest) and the Rajmahl hills, forming a belt across India from the 73° to the 89° of longitude, extending, in fact, from near the mouth of the Nerbuddeh river to the Ganges at Rajmahl. The southern limit of trap is much lower than is assigned to it by Mr. Calder,[†] as Dr. Voysey describes a basaltic dyke at Seringapatam, in latitude 12° 26′; and Mr. Calder himself mentions partial deposits of overlying rocks as far south as Cotallum, at the extremity of the great western range, between the parallels of latitude 8° and 9°. Mr. Babington, passing through Mysore, describes all the black rocks he met with as hornblende passing into basalt. He evidently adverts also to nodular basalt.[‡]

Age of Trap.—With respect to the age of the great trap formation of India, it would appear from Major Franklin's Memoir on Bundelkund, that its northern extremities rest on sandstone, which he considers identical with the new red sandstone of England; the trap would therefore be posterior to the carboniferous series and belong to the supermedial order. But the Rev. Mr. Everest[§] adduces valid reasons for questioning the correctness of Major Franklin's opinion; and it may be inferred, that he is doubtful with respect to the exact equivalent in Europe of the Indian sandstone, as it is much associated with the primitive rocks.[‖] In fact, where are the oolitic rocks above, and the magnesian below the red sand, where the rock salt and gypsum, and where, above all, the characteristic organic remains of the lias and magnesian limestone? It would be idle, therefore, to speculate on the era of a formation without a standard of comparison to direct the judgment. The question of the manner of the formation of the horizontal beds of trap with their vertical edges is very interesting. It will be said they were ejected under the pressure of an incumbent ocean. If such had been the case, where are the marine remains, and would not there have been sedimentary deposits upon them? Moreover, if viewed as coulées from craters, would not the beds have thinned out, instead of preserving the parallelism of their superior and inferior planes and their vertical edges.

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[*] Gleanings of Science, vol. iii. p. 135.

[†] The limitation of trap by Mr. Calder of course is only intended by him to be understood as of a *continuous formation*: basaltic dykes, and veins, of every shape and size, being universally found in S. India. (See Dr. Benza's geological papers in Nos. 12, 13 and 14 of this Journal). Editor *Madras Journal.*

[‡] Geo. Trans. 1st Series, vol. v. p. 325.

[§] Gleanings of Science, vol. iii. p. 211.

[‖] Gleanings of Science, vol. iii. p. 213.

Laterite.[*]—Laterite is a ferruginous clay mottled red and yellowish. When first dug from its bed, it is soft, and is easily fashioned into the form of bricks or large square masses for building; and if my recollection serves me right, it constitutes the material of the walls of the fort at Tellicherry and the jail at Calicut. It rapidly indurates on exposure to the atmosphere. It is destitute of fossils as far as is yet known.

That curious and very extensive rock, aptly denominated laterite (I learn from the information of a friend), occurs at the source of the Kristna river in latitude 17° 59′, at an elevation of 4,500 feet above the sea. It covers the low land between the sea and the great western range from the southern Konkun to Cape Comorin, and, agreeably to Dr. Davy, passes into Ceylon. I casually observed it at Tellicherry and Calicut, respectively seven hundred and forty-four and seven hundred and fifty-six miles south of Bombay; and at Calicut granite rises through it. On the low land at the base of the great *eastern* range, Mr. Calder says it re-appears between the 11° and 12° parallels of latitude, and recurs in increasing patches passing northwards, covering granite. The Rev. Mr. Everest speaks of laterite forming a fringe to great part of the bay of Bengal and covering the edge of the granite of either peninsula.[†]

Nodular Limestone.—In addition to the evidence already adduced of the extensive occurrence of nodular limestone, Dr. Buchanan mentions having met with it in Rajmahl trap hills, in Bengal, and in Mysore. A writer in the 'Gleanings of Science'[*] states that it occurred in repeated borings for water in Calcutta, at from 50 to 112 feet below the surface. Another writer[†] says, it is "very extensively distributed throughout Hindoostan," and further asserts that it is a "most distinguished feature of Indian geology." The Rev. Mr. Everest and Mr. Royle remarked it in their journey before adverted to. The few organic remains hitherto found imbedded, belong to living species. The following is the analysis of "Kankar"[‡] (nodular limestone) by Mr. Prinsep.[§]

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[*] With regard to laterite, see note at foot of page 364 of this article, and the former Numbers of this Journal quoted therein.—Editor *Madras Journal.*

[†] Gleanings of Science, vol. iii, p. 135.

Water of absorption	1.4
Carbonate of lime	72.0
Carbonate of magnesia	0.4
Silex	15.2
Alumine and oxide of iron	11.0
	100.0

Kunkur, or nodular limestone, has been likened to the cornbrash of the English strata; but its geological position (principally superficial), and the absence of characteristic fossils, present insuperable objections to their identity.[‖]

Granite.—The late Dr. Voysey states, that he "had reason to believe, partly from personal observation and partly from specimens "obtained from other sources, that the basis of the whole peninsula "of India is granite; he had traced it along the coast of Coromandel, "lying under iron clay (laterite); also in the bed of the Godavery "river, from Rajamahendri to Nandair; and he had specimens from "the base of the Sitabaldi hills of Nagpoor, from Travankur, Tinne-"velli, Salem, and Bellari." Mr. Stirling in his memoir on Cuttack says, "The granite where my specimens were principally collected "appears to burst through an immense bed of laterite (iron clay) "rising abruptly at a considerable angle".[¶] Major Franklin adds to the above quotation, "the plains of Bundelkhund attest that granite is

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[*] Gleanings of Science, vol. i. p. 169. [†] Ibid. vol. i. p. 365. [‡] Properly *Kunkur*.

[§] Gleanings of Sicence, vol. i. p. 278.

[‖] Kankur seems to be a sedimentary rock, resembling the *travertine* of Italy; some is ancient, and some modern and still forming. For Dr. Benza's opinion of this substance, see Madras Journal No. 12, pp. 15, 27.—Editor *Madras Journal.*

[¶] Phys. Class, Asiatic Researches, p. 37.

"there the basis rock." Ceylon is exclusively granite and gneiss; finally, I observed granite rising through laterite at Calicut on the Malabar coast. With these facts before us, we can scarcely question the truth of Dr. Voysey's opinion; an opinion involving the belief, with reference also to the extent of trap, that the whole peninsula of India and Ceylon, covering an area roughly calculated of 700,000 square miles, is of igneous origin.*

Sedimentary Rocks.—I am not aware of the existence of any sedimentary rocks in western India, south of Baroach, excepting such as have probably originated in the consolidation of comparatively recent alluvium.

Recapitulation.—I close this paper with a recapitulation of the characteristic geological features of the peninsula; namely,—the amazing extent of the trap region, and the horizontal position of its stratified beds the granitic basis of the whole country; trap veins in granite; the absence, as far as is known, of that uniform series of rocks which constitutes the formations of Europe; the extended and peculiar nodular limestone and laterite formations; the occurrence of pulverulent limestone in seams; and finally, the non-discovery hitherto of the fossil remains of extinct animals within the limits of the peninsula.

A few words are necessary in explanation of the sections (Plate [illegible] which accompany this paper. They represent two principal spurs from the ghats, and converge to the same point at the junction of the Goreh and Beema rivers. In strictness they are not sections;—ramifications of the spurs, and hills at short distances north and south of the central vertical plane being inserted: they partake, therefore, of a slightly perspective character, but this does not affect the general correctness of their geological features. Fig. 1. comprises the range of hills between the Under and Beema rivers, and has a length of about seventy-five miles. Fig. 2. shows the mountains between the Bore ghat and the source of the Mota river, and extends nearly eighty miles. The length and elevation are expressed by different scales, and from this cause the outlines of the mountains are not rigidly correct. A bare outline is traced from the ghats westward to the sea, for the purpose of showing

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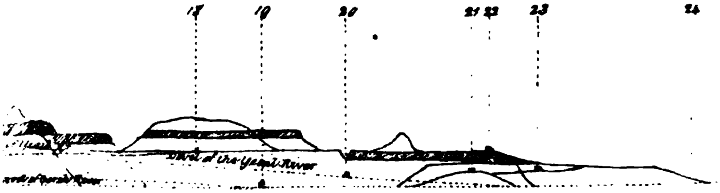
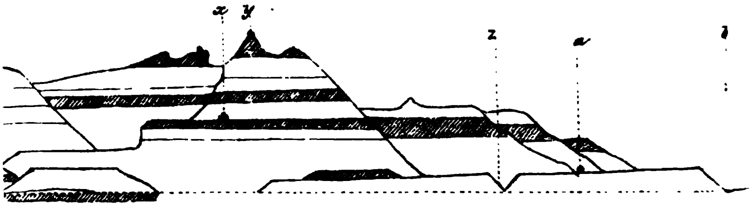
* More extended observation proves this universal prevalence of granite. Dr. Benza found it at the summits of the Neelgherries, and in the plains, and we have specimens from the Goomsoor mountains on the eastern coast, and from very many other localities. —Editor *Madras Journal.*

Vol. VII Pl.





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the curious forms of the weathered basaltic caps and ridges of the mountains in the Konkun.

The elevations were determined either barometrically, or thermometrically. Those marked "B." in the subjoined description are barometrical, and result from simultaneous observations with previously-compared barometers; all the necessary corrections having been applied, for temperature, moisture, and latitude. Those marked "W." were obtained by ascertaining the boiling-point of water at different elevations with delicate thermometers: they are not to be relied upon within one hundred feet, although in some instances, when tested by barometrical measurements, they corresponded within a few feet.

DESCRIPTION.

FIG. 1—Elevation and declination of the country above the ghats, between 73°, 35′ and 74° 49′ east longitude, and the parallels of 18° 50′ and 19° 10′ 31″ north latitude: shewing the geological structure of the same.

1 —Mullunghur.
2 —Hill at Ahopeh, 3525 W.
3 —Ahopeh, source of the Goreh river.
4 —Neelsee, 2326 W.
5 —Beema Shunker, source of the river Beema, 3090 B.
6 —Pahtun on the Goreh, 2242 B.
6½—Ambolee, 2279 W.
7 —Mhou, 2104 W.
7½—Tulleghur.
8 —Ambegaon, 2044 W.
9 —Warreh, 2123 W.
10 —Dyke near Ombreh.
11 —Ombreh, 2081 W.
12 —Goreh, 2028 B.
13 —Mahloonga, 2094 W.
14 —Kheir, 1963 B.
15 —Chakun, 1936 B.
15½—Pait, 2482 B.
16 —Munchur, 1877 W:
17 —Dyke at Digghee.
18 —Pabul, 2035 W.
19 —Kowta, 1830 B.
20 —Cheencholee, 1871 W.
21 —Serroor, 1742 B.
22 —Kurdeh, 1873 W.
23 —Neerwee, 1704 W.
24 —Bed of Goreh and Beema rivers, at junction 1499 W.

FIG. 2—Elevation and declination of the country above the ghats, between 73° 35′ and 74° 49′ east longitude, and the parallels of 18° 28′ and 18° 50′ north latitude: shewing the geological structure of the same.

a.—Panwell at high water mark.
b.—Panella.
c.—Choke.
d.—Campolee, 240 feet W.
e.—Hill above Kundalla, 2694 W.
f.—Kundalla, 1743 B.
g.—Source of Moteh river, 3136 W.
h.—Hill fort of Koaree, 3163 W.
i.—Village of Koaree, 2525 W.
j.—Slanowlee, 1949 B.

k.—Ambegaon on the Powna river, 1881 w.
l.—Yagruh on the Moteh river, 2466 w.
m.—Karteh cave, 2531 B.
n.—Karleh travellers bungalow, 2016 B.
o.—Hill fort of Loghur, 3382 B.
p.—Dykes in Karleh valley.
q.—Borkus on the Molah river, 2083 w.
r.—Moteh, 100 feet above Moteh river, 2156.
r 2.—Wurgaon, 1981 B.
s.—Damun on the Powna river, 1765 w.
t.—Panowleee on the Powna river, 1783 B.
u.—Adkunwaree at foot of Singhur, 2277 w.
v.—Hill fort of Singhur, 4162 B.
w.—Poona, (Colonel Sykes' house), 1823 B.
x.—Pait at foot of Hill fort of Poorundhur, 2950 B.
y.—Summit of Hill fort of Poorundhur, 4472 B.
z.—Bed of Beema and Moteh Mola rivers at the junction, 1703 w.
a.—Neerwee, 1704 w.
b.—Bed of Beema and Moteh Rivers at the junction, 1499 w.

The shaded parts are basalt of various kinds; the unshaded are varieties of amygdaloid, quartz, zeolite, &c. &c.

Of the Panoramic sketches, Plate 8, No. 1. is a distant view of the mountains, on which are situated the celebrated hill forts of Jewdun, Hurreechundurghur, Koonjurghur, and Sewneir, in which Sewajee, the founder of the Mahratta empire, was born. It is taken from the hill N. of the town of Goreh.

No. 2. is a view of the hills, to the north and east, as seen from Lakungaon in the flat broad valley of Jooneir (Sewneir).

No. 2.* is a continuation of the view No. 2, from the N. round to the west.

No. 3. a sketch of the hills, to the north and east, as seen from the summit of the armoury, in the fort of Ahmednuggur.

No. 4. is a sketch of the northern flank of the plateau, on which the city of Ahmednuggur stands; as seen from Wamooree, in the plain of the Godavery river.—*Transactions of the Geological Society of London. Second Series, Vol. IV, page* 409—432.

2.—*A Statistical and Geological Memoir of the Country from Punah to Kittor, South of the Krishna River.**—*By* James Bird, Esq. M.R.A.S., F.R.G.S. *of the Bombay Medical Establishment.*

Some hasty observations, collected during a rapid march that I made in 1824, between Punah and Kittor, gave rise to this memoir, which, though brief and imperfect, may not altogether be devoid of interest, since the geology and statistics of few countries are less known than those of India. Connected as this portion of the globe now is with the political and commercial prosperity of Great Britain, the resources of the country, the mineral treasures of its rocks, the capabilities and productions of its soil, the condition of the inhabitants, and their prospect and means of attaining a higher scale of civilisation, deserve the attention of the legislator, merchant, philanthropist, and man of science. Its statistics and geology are yet desiderata: and though the portion of information here communicated be but a speck on the ocean that lies before us, it will perhaps contribute something towards a clearer view and more accurate chart of the whole, which may be brought, I hope, to perfection in the course of time.

The nature of the soil and appearance of the country.—Two routes may be followed in going from Punah to Kittor. The first lies in the immediate vicinity of the Krishna river; and, after crossing and recrossing it several times from the neighbourhood of Satara to the village of Yerur, meets the other route which lies farther north. It leads through the towns of Sangli and Merich; but, as the vicinity of the Krishna is one unvaried scene of cultivation on a level surface and dark sandy soil, it requires little notice. The other remains to be described.

From Punah to Kittor, the road runs in a south-east direction, parallel to the west coast of India; the Ghats, or western Vindiya mountains being on the right-hand, as the traveller proceeds southward. This route crosses the Krishna, Ghatparba, and Malparba rivers, besides a few others of lesser magnitude, of which the course indicates a southern declination of the country. The two latter rivers, flowing north-easterly for some distance, indicate a partial declination in that direction.

The country within this tract, though comprehending a great variety of soil, may be divided,—1st, Into the table land of the Dekkan, terminating near the town of Pusasaoli and at the Nahwi Ghat, or pass from the high land to the plain below; 2dly, Into that stretching from hence to the Ghatparba river; and 3dly, The tract between the Ghatparba and Kittor.

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* We have introduced this paper as an appendix to Col. Sykes' memoir, as it offers further interesting particulars regarding part of the same tract.—Editor, *Madras Journal.*

The parts now subject to British authority are the territories composing the Punah collectorate, and extending to the west bank of the Nira river, the country of the Satara Raja, which is more or less under the control and management of the resident at that court, and the taluks of Padshapur and Belgaum, at present under the authority of the political agent in the southern Mahratta country. The remainder is divided among the southern Jagirdars, and other tributaries of the British government, which exercises no control over its territorial management.

The Dekkan division, during the dry season, has a very bleak appearance. In travelling southward we continue to pass over chains of barren hills, with flat tops, which occasionally assume conical forms, but never exceed, I think, the moderate height of fifteen hundred feet. Their sides are neither abrupt nor sloping, and are covered by numerous blocks of black rock, which, in the interior of the mountains, appear to have a tabular arrangement, giving them, at a distance, a fortification-like aspect, as if one circumvallation, contained within another, ascended from below.

Only a few stunted bushes are found growing on these hills. The principal of them are different species of mimosæ, the carissa carandas, the flacourtia sepiaria, and the aula of Hindustan.

Between the hilly chains narrow valleys are formed, of which the soil is generally light and gravelly, being ill adapted for any cultivation but that of bajri* and juari,† which require the assistance of a plentiful monsoon. From the scarcity of rain, however, during last season, the crops had not attained more than half a foot in height, though it was now the month of November, and would be totally lost in consequence.

At the village of Jejuri, instead of the continued mountain chains running east-north-east, with narrow openings between, the hills are disposed in a circular manner, like an amphitheatre, and form corresponding valleys. The only produce of these hills is a species of euphorbium called "chuppal shein."

From Jejuri to the banks of the Nira river the country is poor, and the soil is little more than the *debris* of the rocks. But, on approaching the Nira, this becomes black and very susceptible of cultivation, if the round stones scattered over its surface were only removed. The village of Lonud, on the east bank of the Nira, and only a few miles distant, is surrounded by many fine fields well supplied with the means of irrigation and producing abundance of vegetables. The great defect in the agriculture of this part of the country is the want of inclosures, which might be made at little expense, the prickly euphorbium and nerium-leaved being found close at hand for this purpose. Such inclosures, both here and in other parts of the Dekkan, would be a great improvement, since they would defend the vegetation against the strong north-east wind which blows nearly one half the year, and, from its drying influence, robs the soil of its natural moisture and deprives the plants of benefit from the dew.

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* Holcus spicatus.

† Holcus sorgum.

Beyond Lonud, we enter the Salpa pass, and come to the valley of Satara. Here the soil is much richer than that previously met with, being black and alluvial. It rests on a very deep substratum of grey earth denominated *chunkar*, from its containing *chuna*, a calcarious carbonate.

A more plentiful supply of rain in this district had favoured the crops, and the appearance of the country, from its verdure, was pleasing to the eye. The hills, which were green to the tops and covered with brushwood, offered an agreeable contrast to the bleak and barren parts of the country just passed over.

The situation of the village of Deour, in this valley, is romantic and beautiful. It is built on the south-east bank of a deep nulla, which forms a branch of the Wasna river, of which the banks are high and earthy and the bed gravelly. The wild oleander grows in abundance close to the water edge; and, at the village, a variety of fine trees rise in majestic grandeur and afford a desirable shade from the noonday heat of a tropical sun. The houses here are also better built than those usually met with in this part of the Dekkan, and are neatly roofed with flat tiles. The general direction of the streams flowing through this valley is south; those previously met with being north.

From Deour to Pusasaoli is two stages, and the road leads through the Nahwi Ghat. The hills near the Ghat became broken, and the country beyond Pusasaoli is flat, only one or two solitary hills being visible for some distance.

Pusasaoli, which is a large town, contains a good bazaar, and supports a manufactory of black kumlies* for the Satara market.

The different kinds of soil known here are a dark brown one called "tambra," and a gravelly earth denominated "sherwut" or "karrak," according as it contains a less or greater proportion of *chuna*. The substratum of the former is trap in a state of decomposition; and of the other, trap with beds of *chuna*.

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* A sort of blanket.

The first differs but little from the soil of Gujarat, called by Mr. Marshall kali-bhui, of the lower level. It is adhesive and cracks by drying; but, if irrigated, may be cultivated with chuplagheon.*

When the field is ziraut, or dry land, "harbarri jundla"† and shetgheon,‡ may be raised during the cold weather on this kind of soil; but bajri is its most common produce, which comes to perfection in the rainy season. The other kinds are usually cultivated with kardu|| and karli.§

The neighbourhood of this town presents extensive fields of good black soil in a waste state, which have not been cultivated on account of the almost total absence of rain during the last two seasons. The fields on the east side only were in use, as abundance of means from nullas and wells exists there for irrigation.

Parts of the country comprehended in the second division are equally barren as those that have been described in the first; but the rich and beautiful fields on the banks of the Krishna, amply compensate for the few miserable villages and unproductive lands which we meet with near the Yerla river.

Among the latter the village of Aundhli was the most poor and desolate. The soil, which is here very sandy, rests on a bed of gravel, and produces nothing without the assistance of a plentiful monsoon; from the failure of which, last season, an almost total absence of vegetation became the natural consequence, and the inhabitants, with the exception of a few, had deserted the village.

The distinctions of the soil known at this place are "changli kali zamin," or pure black earth, which is a tolerably rich black mould from three to four feet deep, resting on another of a grey colour, which contains much *chuna*. It is divided into the dry and garden lands; but of the latter there are very few near Aundhli, and these are usually assessed at twelve rupees per bigah. The next kind of soil is that known by the name of "marut," which is a black earth of a reddish tinge resting on gravel, and is usually two feet deep. This is generally cultivated with sealu,¶ and is taxed from six rupees and a quarter to seven and a half. The last of the soils is "karrak," which, like the former, rests on a bed of gravel, but is seldom more

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* Triticum monocum.

† Cicer arictinum.

‡ Triticum spelta.

§ Verbesina sativa.

|| Carthanus Persicus.

¶ Holcus saccharatum.

than a foot in depth. It is divided into a better and worse kind, according as the proportion of grey calcarious earth be more or less to the quantity of stones and gravel. It commonly lets from a rupee and a quarter to a rupee and a half, and is cultivated with different kinds of oil plants.

As we approach the banks of the Krishna, the country lies before us one extensive plain to the south-east and north-west, whilst the ridges of hills on the north and south are barely visible and at a distance. The banks of the river, which are deep and shelving, are composed of black earth with mixed sand. The greater part of the soil on the north or left bank is of this description, but that on the right or south bank is more gravelly.

From the Krishna river at Yervei, to the Ghatparba at Argul, the country undulates, and presents here and there hilly ranges of broken basalt. Some parts of it consist of extensive plains covered by a little stunted grass, serving as pasture to numerous flocks of antelopes, where only a few patches of scanty cultivation may be seen about the villages, and nothing can be expected in the way of improvement when the poorness of the soil, and the want of water, are inseparable obstacles to all attempts at cultivation.

On the banks of the Ghatparba the hills of Padshapur became distinctly visible, and have a beautiful green appearance from being covered by thick jungle to the top, announcing at once the great difference of the country we have now approached from that we have left behind.

The greatest length of the hills appears to be from east to west, but the fine valleys, surrounded by them, open to the north and south. It is in this direction, also, that the Ghatparba flows to form the falls of Gokauk, which will be noticed after having described the appearance of the country through which our route lay. The valleys between the hills are very fertile and highly cultivated. Many of the fields have been reclaimed from a state of jungle waste by cutting down and burning the brushwood; and much more in this way remains to be done, but can only be performed by those who have capital, and to whom, therefore, liberal encouragements should be held out. The soil is light and gravelly, but capable of producing rich crops of sealu and tur.*

Near Belgaum the country again becomes undulating, and the low sloping hills which here diversify the landscape, are covered by a deep stratum of black earth to within a few yards of their summits.

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* Citysus cajan.

Amygdaloidal pieces of broken basalt may be found on the surface of their greatest ascents, and numerous springs of good water are seen percolating through the amygdaloid rock composing the interior of the hills. The small streams flowing from thence, when obstructed in their course, form bogs, where a continued annual production and decay of water-plants causes an accumulation of the soil.

But in situations where the water is in sufficient quantity to reach the hollows and lower grounds, it is then retained by means of a bund or dam, in order that the field may be cultivated with rice. The soil of these hollows is black and alluvial.

In other places the soil of Belgaum, which is red and ferruginous, proves very inimical to healthy vegetation. The mango trees, which are very numerous in this vicinity, soon become dry and withered in appearance, and never acquire that beautifully conical form which they invariably assume in a more favourable and natural bed. The country for many miles to the north-east, is composed of marshy ground, and is cultivated in the monsoon with rice, and in the cold season with harbarri.

From the village of Chota Bagwari, fourteen miles beyond Belgaum, the red ferruginous soil may be found at the base of the mountain ridges until we reach Kittor, where the hills have flat tops, and are covered by thick jungle instead of pasture grass, as at Belgaum. They are composed of a stratified rock shewing alternate white and brown stripes, of which the extraordinary magnetic property will be described in the mineralogy of this part.

Water is here less abundant in the high land than at Belgaum, but is in greater quantity both in the tanks and nullas. Rice is always cultivated on the low lands, and sealu is the usual product of the higher level.

Falls of Gokauk.—This cataract, which is formed by the stream of the Ghatparba river, passing over a perpendicular quartz rock of a hundred and seventy-six feet, receives its name from the old fort of Gokauk, now in ruins. From this it is distant about two miles; is nearly ten miles east of the town of Padshapur, and about a mile from the village of Kanur. The Ghatparba here flowing east-south-east, not finding a passage north-eastwards through the body of the quartz sandstone hills of Padshapur, has forced itself in a southern direction, and passes into an extensive plain of which the declination is southerly.

In the dry season the body of water forming the fall is not very considerable; and the stream, after being broken by an intermediate projection of the rock, descends in two separate columns to a semicircular basin of still water. It has, then, nothing very grand in its appearance similar to what is told us of Niagara; but, in picturesque beauty, may bear a comparison with the other celebrated cataracts which have engaged the attention of travellers. The whiteness of the descending columns; the glittering rainbow appearance of the dazzling sun-beams on the silvery spray; the murmuring noise of the water falling into the clear still basin below; the black rugged appearance of large square blocks of perpendicular quartz rock abounding in the bed of the river; and the natural loneliness of the surrounding jungle, conspire to leave behind impressions which may be better felt than described.

When, however, the stream of the Ghatparba has been swollen by the rains of the monsoon, the cataract will be seen to greater advantage. The breadth of the river at this time cannot be less than a hundred and eighty yards, and the sheet of descending water must form a grand and magnificent object.

Even the apathetic Hindu could not here contemplate unmoved the majesty of nature, having recorded his admiration of her works by erecting a temple on either side of the cataract; and dedicating them to that God who, in his creed, possesses supreme power in nature's destructive operations.

Where the quartz sand-stone hills ascend from the river there is a Mahadeva temple built on each bank, which, judging from the style of the architecture, may lay claim to considerable antiquity. The roofs are formed of long flat slabs of quartz rock, supported by short thick pillars of the same, and must have been constructed at great trouble and expense, when we consider the hardness of the materials composing them. The general figure of the temple is oblong; and each consists of only one story having several smaller side ones. They, therefore, differ from Hindu temples of modern erection, which are usually pyramidal, and have several stories diminishing in succession to the top.

The rock in the bed of the river, and near the edge of the cataract, has been formed into deep circular holes of two to three feet in diameter, which have been apparently formed by the eddies originating in a stream of water, that, meeting with resistance, receives a circular motion.

From the brink of the semicircular basin, hollowed out by the falls, we descended to the water edge in order to view the cataract below. The path lies on the right-hand side between vertical columns of quartz rock; and the breadth of the passage is only sufficient to allow of one person going at a time. The opening leading into this from above is so low that it was necessary to creep on our hands and knees to get through. The loose blocks of rock wedged between the perpendicular columns, and forming its roof, hung over our heads like the sword over Damocles, keeping us in continual apprehension that the frail means of support giving way we might be crushed by their fall.

On descending to the water edge the cataract is seen to less advantage than when viewed from above, the rainbow appearance being no longer observable. The echoing noise of the falls, however, is grand and impressive; and the large square masses of stone which have been hurled below by the rains of the monsoon, or the roots of the jungle plants penetrating fissures of the rock, lead us to think on the slow and silent influence of time midst this depth of solitude.

The scenery about the cataract is worthy of admiration; and, in concluding this account, I may venture to say, that if a traveller's expectations are not fulfilled by a visit to the spot, his curiosity will at least be gratified.

Mineralogy of the country.—The elevated table-land of the Dekkan is exclusively composed of rocks belonging to the fletz-trap formation. The hills which rise on the western ghats as a base have conical or tabular forms, and are sometimes distributed in long ridges or terraces which run east-north-east.

At the openings in the hills west of Punah, known by the name of the Ghats, and which are the passages from the lower land of the Konkan into the higher land of the Dekkan, these tabular forms are grand and beautiful. They are generally triangular shaped, and insulated from each other by broad and deep ravines, of which the perpendicular descent cannot be less than twelve or thirteen hundred feet.

The rock composing these tables is compact basalt of a black colour, in which hornblend predominates.

About Punah, and further south-eastwards, the rocks are generally amygdaloidal, and become lighter in colour the farther they are removed from the western entrance. This amygdaloid is in no respect different from the toad-stone of extra tropical climates. It shews embedded masses of chalcedony, zeolites, and green earth; and in the neighbourhood of water courses, at the depth of five-and-twenty or thirty feet below the surface, contains drusy cavities of crystallized quartz, the appearance of which, in digging wells, indicates that water is near.

A clay-iron ore, of a dark-brown colour, is found at this depth; and is sometimes penetrated by circular canals, which have been pervious to water.

The amygdaloid rock, accompanying the iron ore, is similarly penetrated; but its canals are filled up by spiral pieces of white chalcedony.

Calcarious carbonate, denominated chuna, abounds on the banks of the water courses; and is seen occasionally in alternate strata with an impure bole, called by the natives "geru." Chuna is also found, in the form of calk-tuff, in the beds of the nullas; and is seen venegenous in the basaltic and amygdaloid rocks at the village of Lonud, where calcspar is also found in veins.

Green-stone, heliotrope, agates, and horn-stones, are to be met with in the beds of the nullas, and on the banks of rivers.

On the surface of the amygdaloid, and immediately below the soil, specimens of rock crystal are occasionally discovered. They are attached to the quartz veins, which run through the amygdaloid of the Dekkan east and west, corresponding in this respect with the hills of quartz-rock, which we afterwards meet with at Padshapur. The basalt of the Dekkan occurs both in columnar and globular forms, and varies in colour from a bluish grey to a deep black. The latter kind is capable of receiving a high degree of polish, and is employed by the Hindus for the interior of their temples.

Along with the basalt and amygdaloid, there is a determinately aggregated rock of a grey colour, which is found in beds: its structure is porphyritic; and the disseminated crystals appear to be felspar, sometimes associated with calcspar. A somewhat similar rock, but of a red colour, is also distributed in beds through these hills. Of this the structure is amygdaloidal.

Where the formation is traptuff, common opal is to be met with.

From Pusasaoli to the banks of the Ghatparba, the mineralogical nature of the country is little different from what has been now described. Chalcedonies are fewer, and columnar basalt becomes less common the farther we go to the southward. Jaspery clay-iron ore and red hematite appear more frequent, and are particularly abundant near the town of Mulgaon.

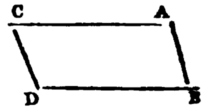
At the village of Argul, only a few hundred yards from the north bank of the Ghatparba, the country changes. The rock here has some likeness to sandstone, but is in fact aggregated quartz-rock. It forms whole hills, of which the long diameter extends from east to west. The structure of this rock is extremely hard, and in appearance it varies from a secondary sandstone to that of pure quartz.

This quartz-rock formation extends as far as Belgaum, where we again meet with the amygdaloid. The undulating ground here, which is of inferior height to the hills of broken basalt, is composed of a red clay-iron-stone or laterite. It is sometimes of a yellowish colour, soft, and in a state of decomposition, from the action of the weather: in such instances it has much resemblance to iron rust. In either case it is hard and undulated, forming an aggregated rock which is used for building.

From Belgaum to Kittor we meet with numerous pieces of iron ore scattered over the surface of the ground. They are most abundant where the soil is red; and are chiefly to be met with near the hills lying south-east from Kittor. Some specimens of the ore are bubbled, having the appearance as if they had suddenly cooled while in a state of fusion. From the mixed nature of the rocks found in this part of the country, quartz, iron-stone, and basalt, being indiscriminately huddled together, I am inclined to think that some strong convulsion of nature must have produced this at some time or other; and the generally bubbled appearance of the rocks warrants this conclusion. Specimens of black quartz are found among these rocks.

In the immediate vicinity of Kittor the structure of the rocks is coarse slaty. They are composed of alternate layers of quartz and iron ore, varying in thickness from the sixteenth-part of an inch to that of a whole, which gives the rock a striped appearance.

The effect which this rock produces on the magnetic needle is, however, the most extraordinary part of its nature. It has no inherent magnetic power, since it does not attract steel under any form; but when cut into a parallelogramical figure, of which two sides are longer than the other two, as here represented, it exhibits great power over the needle of a small pocket compass.



If the side A B be presented to the north pole, it repels the needle; but when brought round to the south pole, it attracts it. When the side C D is presented to the north pole, the effect is *vice versa*; and if the stone be moved circularly over the glass of the compass, the needle is set in motion.

It would appear, therefore, that this rock possesses polarity, but does not exhibit any magnetic power in attracting simple steel. The ore it contains is probably magnetic iron ore; and the well-ascertained fact in magnetism, that two magnets having a free motion will attract when different poles are directed towards each other, and repel when the adjacent poles are of the same name, seems to explain the phenomena.

The cultivation of pán[*].—The agricultural productions which are in general use among the people of the country having been already incidentally mentioned, I here pass over to others less frequently cultivated; and will now give some account of the cultivation of pán.

This leaf which is in very general use among all classes of Hindus, and is chewed by them with supari, is the produce of a creeping plant, which has been denominated a vine. It has a light-green colour and sub-astringent taste, having a degree of pungency which at first excites an increased flow of saliva, but which diminishes, by repetition, the secretions of the mouth, and parches the tongue and fauces.

In using it, a few bruised pieces of the areca-nut, with two or three grains of ilachi,[†] and a small proportion of carbonate of lime, are wrapped up in one or more leaves of the plant. The whole is then chewed by the natives of India, from the same bad influence of example which has given tobacco a similar station among the inhabitants of Europe.

In the cultivation of pán, both wind and sun are carefully excluded, and a cool shade is studiously preserved for the rising plant. With this view an acre or more of ground is inclosed by a double hedge of thuhar,[‡] or closely-bound twigs; and the natural black soil of the place has its capacity for retaining moisture increased, by the addition of a considerable quantity of red argillaceous earth. This fact is practically well known to the pán cultivator, who is generally of a Hindu cast named Tirghul, and is supposed to have originally emigrated to this part of the Dekkan from the Carnatic.

The ground being now ploughed, and manured with horse-dung, if procurable, is smoothed by the harrow; and is then considered to have undergone sufficient preparation for receiving seeds of the sheoga,[§] hutga,[||] and neemb[¶] trees, which grow up as the future supporters to the plant, and intended to serve after the manner of hop-sticks in England. These seeds are usually sown, at the end of the monsoon, in parallel rows of two feet wide; but sometimes a greater distance is left when the garden ground has not been divided into beds, by which it is intended that there shall be sufficient room to allow of the operations of weeding and irrigation being conveniently performed.

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[*] Piper-betel.

[†] Cardamomum minus.

[‡] Euphorbia neriifolia.

[§] Hyperanthera moringa.

[||] Coronilla grandiflora.

[¶] Melia azadirachta.

On the trees springing up, some of them are removed; and in the middle of January, when the remainder have attained a foot or two in height, pán slips are planted near each supporter, and from this date frequent irrigation of the garden becomes necessary. Generally two or more slips are inserted, which, according as they thrive, are afterwards thinned; while, at the same time, the space of a foot and a half is left betwixt each supporter.

The remaining operations are training the pán to its supporter, renewing the red soil, and repeating the manure once a year.

The expense of making a pán-garden of this kind is estimated from four to five hundred rupees, inclusive of the expense of keeping it up until the second or third year, before which time there is no return. The pán plants are not exhausted before the eighth or ninth year, but are deemed most valuable during the sixth and seventh, the leaves being then in perfection.

Religion and classes of the inhabitants.—The Brahmans, who are divided into the Konkanist, Deshist, and Karradi sects, form but a small proportion of the inhabitants of the country, and are to be chiefly met with in the neighbourhood of great towns, where they have hereditary right in the soil. They are in great numbers on the banks of the Krishna; and guided, as would appear, in their choice of settlements, by an idea of comfort, or the hopes of gain, are therefore less numerous in the Dekkan division than further south, where a greater field is open to their ambition, from the country being under the protection of men of their own class. Those of the Sudras practising trades, and who are divided into as many tribes as there are arts among them, also bear a very small proportion to the great body of the people, which is composed of common Mahrattas and Lingaiyats.

The common Mahrattas, who are cultivators, are principally met with extending from the Dekkan as far south as Tasgaon; and the Lingaiyats inhabit the country from hence to Kittor. The language of the former ceases to be generally spoken after passing Tasgaon; and the Kanari is then universally used by the lower orders of the people.

Many of the Lingaiyats are employed in trade, and are, indeed, the principal merchants on the banks of the Krishna. They pretend to high degrees of purity, and carefully abstain from eating fish or flesh—a practice not so religiously observed among the common Mahrattas.

The only object of their worship is the ling, "simulacrum membri virilis," which they generally keep suspended from their necks.

They perform this worship in the Mahadeva temples; but in those only where there is a separate and distinct apotheosis of the *ling*. The ceremonies of their religion are conducted by the viragis, acting under the superintendence of the Brahmans, at the Mahadeva temples; and they are not, as the name implies, simply religious mendicants, who, from choice, have abandoned the concerns of the world; but are the pretended offspring of the god. According to my information, every woman who, being barren, pays her addresses to the temple, and is blessed with offspring, devotes one of the children to the service of the deity; and, in the event of that child being a male, he becomes an officiating priest among the Lingaiyats.

It is almost unnecessary to remark the degrading superstition of such a religion; for however pure may have been the original metaphysical idea of the institution of the lingam, the effect now speaks for itself.

At Yerur, on the Krishna, the Lingaiyats have a celebrated temple, liberally endowed with freehold lands for the support of the Brahmans and dancing-women. It is dedicated to MAHADEVA, and is celebrated for two deifications of the ling; one in its generative capacity, named VIRABHADRA, signifying the prosperous hero; the other in a destructive capacity, named VIRAPATRA.

The Jainas are also met with in considerable numbers south of the Krishna. Their establishments are monastic, as the Jainas live in a manner separated from the other inhabitants of a village. Their houses, congregated together, and opening into a square court, are surrounded by a wall, within which stands a temple for the community, where PARISNATH is the chief object of worship.

The Jainas are mostly engaged in trade, and appear in their manners to be less influenced by superstitious observances than other Hindus.

Condition of the People.—Muhammedan history has informed us, and the experience of our time serves to confirm it, that the Dekkan has been at all times more subject to famine than most other parts on the western coast of India. This happens, as would appear, when the lighter and upper strata of the clouds are carried over that elevated table-land by a strong south-west monsoon wind. The heavier and inferior strata, when attracted by the lower country and hills of the Konkan, descend in rain; so that, none being left for the parched lands of the Dekkan, famine is an inevitable consequence; and the miserable inhabitants, forsaking their homes to seek for food and shelter in the neighbouring countries, extend the evils which follow a partial monsoon.

After a favourable rainy season, however, the Dekkan teems with grain; though such is the irreparable loss caused by a bad one, that several prosperous years can scarcely bring with them a recompense. The little property of the people is expended in retaining their existence: their cattle die for want of food. There are few of them so provident as to think of laying in a stock of grass from the Konkan against a bad season; and their fields remain uncultivated; as they have not the means of doing so without getting more deeply in debt to an artful set of foreigners, the Gujar and Marwari Banias, who come here intentionally to raise a fortune, and take every advantage of the poor cultivators which chance throws in their way.

This is not a fanciful picture, and is a state of things obvious to all making the inquiry; for the evil has been demonstrated by the fatal experience of the last two years, in the former of which but little rain fell, and almost none during the latter. I have ascertained, by repeated inquiry, that when many of the villagers are pressed for subsistence in the hot season, it is usual for Banias to advance grain, on the condition of its being repaid double when the ensuing harvest ripens. The crop, therefore, raised by the cultivator is actually in the hands of the Bania before it has been cut down; and as the cultivator is his dependent, he has no remedy but to run again the same course.

In a country like the Dekkan, so liable to have alternate good and bad seasons, a wide field is open for the intrigues of such men; and the evil of the system is too great not to require a check from the legislature,—when it is an observation, not alone applicable to the natives of India, that men get into debt in proportion as the means of doing so become facilitated.

The government and its officers are much disposed, no doubt, to ameliorate the condition of the inhabitants; and there is reason to think that the mild spirit of British jurisprudence prevails in all that has been done for the country. It is to be feared, however, that its servants, in their over-zeal for the interest of the government, may mislead it, and adhere too strictly to former custom in their assessments of lands. It may also be doubted if the assessment of former governments forms a fair criterion for our guidance; since our executive is so good, and every thing so minutely noted, that the people are deprived of many advantages derived from the grass and waste lands under the negligence of our predecessors.

The inhabitants generally betray signs of great poverty. To see a silver ornament on the child of a cultivator in the Dekkan, is nearly as rare as it is common in the Konkan. It may be urged, perhaps, that they are thoughtless, spending their money on feasts, festivals, and marriages; and that they are less guilty than other Hindus in this respect, I dare not advance, though I may venture to assert that they are not more so than those in other parts of the country, where there is more wealth and greater comforts. The fault rests not then with them, but with the country where they have been doomed to live; and of this such is the poverty, that it must be assessed lightly until a little capital has been created among the riots or cultivators.

It is a general complaint in the Dekkan, and indeed among all classes of natives, that the country is becoming poorer and poorer every day. That the Hindus are much inclined to make such complaints, and sometimes without cause, is well known; but this is one which is well founded. India is situated, in regard to her commerce with England, precisely as Europe formerly was in regard to India, where large commercial purchases being made by the former to supply the necessities of the state and individuals, little is taken in return by the latter country, which thus drains the other of its specie. This increasing poverty cannot be prevented if resources in this country are not found to render it independent of supplies from England, or its exportable produce be not allowed import there on more favourable terms than those now in force.

In a country, too, like this, where the manure of the dairy is used as fuel, it is difficult to decide what should be done for the improvement of the land. It is known, however, that soil is much improved by stagnant water; and if the natives in favourable situations would be advised to construct earthen bunds for retaining the rains of the monsoon, much of the hilly soil might be converted into tolerable land. Though the inhabitants on the banks of the Krishna appear more comfortable than those of the Dekkan, they were suffering, in common with the latter, from the partial fall of rain during last year.

The country about Belgaum can seldom or ever want for water, when so many springs are flowing from the hills; and as the monsoon both there and at Kittor seldom entirely fails, the lands are very productive, and the condition of the inhabitants good. There is, moreover, a spirit for manufacture among the people in that part of the country, which has, no doubt, bettered their condition, and forms a striking contrast to that of the people farther west.—*Journal of the Royal Asiatic Society*, vol. 2d, pp. 65, 80.

3.—*Abstract of the Journal of a Route travelled by Captain* S. F. Hannay, *of the 40th Regiment Native Infantry, from the Capital of Ava to the Amber Mines of the Húkong valley on the South-east frontier of Assam.—By Captain* R. Boileau Pemberton, 44*th Regiment. N. I.*[*]

From the termination of the Burmese war to the present period the spirit of inquiry has never slept, and the most strenuous exertions have been made by the officers employed on the eastern frontier to extend our geographical knowledge to countries scarcely known but by name, and to acquire some accurate information regarding the manners, customs, and languages of the various races of men by whom they are inhabited.

The researches of Captains Bedford, Wilcox, and Neufville, and of Lieut. Burlton in *Assam*, dispelled the mist which had previously rested on the whole of the eastern portion of that magnificent valley; and the general direction and aspect of its mountain barriers, the courses and relative size of its rivers, the habits of the innumerable tribes who dwell on the rugged summits of its mountains, or on the alluvial plains at their base, were then first made the subject of description, founded, not on the vague reports of half-civilized savages, but on the personal investigations of men, whose scientific attainments enabled them to fix with precision the geographical site of every locality they visited. The journey of Wilcox and Burlton to the sources of the *Irawadi* river had proved the absence of communication between it and the great *Tsanpo* of *Thibet*, but they were unable to prosecute their examination further east; and though their researches had extended to a point not more than twenty miles distant from the meridian on which the labors of the Jesuit Missionaries in *Yunan* had been abruptly terminated, the intervening space, and great valley of the *Irawadi* still remained closed against them, and every attempt to enter either, from *Assam* or *Manipur*, was defeated by the jealous vigilance of the Burmese authorities.

It is generally known that the course of the lower portion of the

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[*] Attention has been forcibly drawn, within the last few years, to the countries situated to the north-east of our Indian empire; both on account of the interest and importance of the discovery of indigenous tea plants in Assam, and for the political consequence which these regions possess, from their vicinity to, and relationship with, the great empires of China and Ava. We introduce, therefore, the above paper as a narrative of the most novel and interesting expedition of recent times as regards the East. A route map accompanies the article in the Bengal Journal; but the reader will be able to follow the traveller with the published maps of the country, and to note down pretty correctly the newly described places.—Editor *Madras Journal.*

Irawadi river, or that part extending from *Rangun* to *Ava*, had been delineated by Lieut. Wood of the Engineers, who accompanied Captain Symes on his embassy to that Court; and that the features of the surrounding country, the size of the towns, its natural productions and population, had at the same time been investigated by the accurate Buchanan. Charts of this portion of the river, extending to *Monchabu*, the capital of the great Alompra, had at a far earlier period been constructed, but the surveys were avowedly made in a manner not calculated to inspire much confidence in their accuracy; and the attention of Europe was first extensively drawn to this field of inquiry by the publication of Symes, whose exaggerated views of the civilization, power and resources of the Burmese empire were generally adopted, while the more accurate estimates of his successor Coxe were treated with comparative disregard.

In the very infancy of our intercourse with the Burman empire, and when the most persevering attempts were made to obtain settlements at various points of the coast, the more remote stations on the upper portion of the *Irawadi* river were not forgotten; and *Bamu* or *Bamo* was even then known as the emporium of a trade between the Burmese and Chinese, in which our aspiring merchants were most anxious to share. It is asserted that, at the commencement of the 17th century, factories were established in that neighbourhood, but the permission to remain was shortly afterwards withdrawn, and the information which it is supposed was then obtained of the surrounding country has never been rescued from oblivion:—this is the less to be regretted as the loss has been fully compensated by the results of recent research; and the journey of Captain Hannay, of the 40th Regiment Native Infantry, from *Ava* up the *Irawadi* river, to the frontier towns of *Bamo* and *Mogaung*, has at length rendered this hitherto inaccessible region almost as well known to us as the more southern districts, through which this noble river directs its course. Many geographical points of extreme interest have been determined by the personal observation and inquiries of this meritorious officer. *Bamo* has for the first time become accurately known from the same source—much valuable information has been gained respecting the trade carried on between *Ava* and *China* in this remote corner of the *Burman* empire—the habits and localities of some of the principal tribes occupying the mountainous tracts bordering on western *Yunan* have been successfully investigated—the position of the very remarkable valley of *Hukong* has been determined—the *Pyendwen* or amber mines have for the first time been examined by the eye of European intelligence—the latitudes of the principal towns between *Ava* and *Mungkhong* have been ascertained by astronomical observation with a degree of accuracy sufficient for every purpose of practical utility, and they may now be regarded as established points, from whence inquiry can radiate in every direction with a confidence which the most zealous and enlightened investigators have been hitherto unable to feel in prosecuting their researches, from the want of a few previously well-determined positions at which to commence or terminate their inquiries.

To an act of aggression on the part of a *Singpho* tributary of *Ava* against a chieftain of the same clan residing under our protection, are we indebted for the opportunity of acquiring the information now gained, and the feud of two insignificant borderers may prove the immediate cause of a more intimate communication than had ever previously existed between our recently acquired possessions in *Assam* and the northern provinces of the *Burman* empire.

The Bisa and Dupha Gaums are the heads of two clans of Singphos, occupying the northern and southern faces of the chain of mountains, which forms a lofty barrier between *Ava* and *Assam*. The former chieftain, on our conquest of the latter country, tendered his submission and was admitted within the pale of that feudatory dependence which many other tribes of the same clan had been equally anxious to enter;—he was uniformly treated by the local authorities with great consideration, and was located at the northern foot of the *Patkoi* pass leading from *Assam* to the *Hukong* valley. Between this chieftain and the Dupha Gaum a feud had existed long previous to our assumption of the sovereignty of the country; and the latter, at the close of the year 1835, headed a party, which crossing the mountains from the Burmese province of *Hukong*, entered *Bisa*, the residence of the chief of that clan, and after ravaging and plundering the village, sealed their atrocity with the indiscriminate murder of all the inhabitants that fell into their hands. The circumstances were made known to the British Resident at the Court of *Ava*; inquiry was demanded, and security required against the recurrence of similar acts of aggression. A deputation from the capital was ordered to the Burmese frontier for the purpose of instituting the necessary investigation, and Colonel BURNEY, the enlightened representative of British interests at that court, failed not to avail himself of the opportunity thus unexpectedly afforded, of attaching an officer to the mission; and Captain HANNAY, who then commanded his escort, was selected for the duty.

The party, consisting of the newly appointed Burmah governor of *Mogaung*, of Captain HANNAY and several Burmese officers of inferior rank, with a military escort, left *Ava* on the 22d of November, 1835, in a fleet of 34 boats of various sizes, for a part of the country which had been uniformly closed against strangers with the most jealous vigilance. "No foreigners," says Captain HANNAY, "except the Chinese, are allowed to navigate the *Irawadi* above the choki of *Tsampaynago*, situated about seventy miles above *Ava;* and no native of the country is even permitted to proceed above that post, excepting under a special license from the Government. The trade to the north of *Ava* is entirely in the hands of the Chinese, and the individuals of that nation residing at *Ava* have always been vigilant in trying to prevent any interference with their monopoly."

The mission was detained the two following days near the former capital of *Amarapura*, to complete the quota of troops by which it was to be accompanied, and whose discipline, when they did join, was very soon found to be on a par with their honesty.

"They work their own boats," says Captain HANNAY, "some of which are covered in, and others are quite open. Their musquets (if they deserve the name) are ranged here and there throughout the boat, and are never cleared either from rust or dust, and wet or dry they are left without any covering. Each man carries a canvass bag, which is a receptacle for all sorts of things, including a few bambu cartridges. He wears a black Shan jacket and a head dress or *goungboung* of red cotton handkerchief, and thus equipped he is a complete Burmah militia man. They appear on further acquaintance to be better humoured than I at first thought them, but they are sad plunderers, and I pity the owners of the fields of pumkins or beans they come across. I have remarked that whatever a Burman boatman eats in addition to his rice, is generally stolen."

Except at *Kugyih*, where there are said to be several Christian villages, of which, however, no satisfactory information could be obtained, the progress of the mission was unmarked by any circumstance of interest, until its arrival at *Yedan*, where they entered the first *kyouk-dwen*, or rocky defile, through which the river directs its course. Lower down, the extreme breadth of the stream had varied from one to two and a half miles, but here its width was contracted to less than a quarter of a mile, with a porportionate increase in the depth and velocity of the current. During the rainy season of the year, boats shoot through these narrow passes with terrific velocity, and the numerous eddies caused by the projecting rocks, add greatly to the danger of the passage. In this part of their course, the mission frequently met large rafts of bambus descending from the *Shueli* river, and upon them, small baskets of pickled tea, brought from the hills to the south-east of that river. This tea was said to be manufactured by a race called *Palong Paon*, who are under *Momeit*. At *Tsingu*, Captain Hannay saw three native Chinese from *Thengyichu* or *Mounyen*, and several others in the service of the noblemen of the court, had accompanied the expedition from *Ava* with the view of proceeding to the *Kyouk Tsein*, or Serpentine mines near the sources of the *Uru* river, west of the *Irawadi*. On the 30th of November the party left the village of *Yedan Yua*, where a perceptible change takes place in the character of the country and river. "The latter," says Captain Hannay, "from covering an extent of miles is sometimes confined within a limit of 150 yards, without rapids or torrents, as I had expected, but almost as still as a lake. In some places its depth is very great being upwards of ten fathoms. It winds through beautiful jungle, in which the *pipal*, *simal* trees, and bambus, are conspicuous, and it has, generally speaking, a rocky bed and banks, which last rise to a considerable height, and composed of sandstone, which varies from dark to a white and yellow colour." At the next stage, or *Thikadophya*, Captain Hannay mentions a very remarkable instance of the tameness of the fish, which are not allowed to be killed, and are found from about a mile below the village to an equal distance above.

"If rice is thrown into the water from the boat, a dozen fish, some of them as much as three and four feet long, come to the surface, and not only eat the rice, but open their mouths for you to put it in, and they will allow you to pat them on the head, which I and some of my followers actually did. Some of these fish are apparently of the same species as those called in India *guru* and *ruta*: indeed the Hindus who are with me called them by these names. The breadth of head is remarkable, and the mouth very large; they have no teeth,— at least so the people told me, whom I saw feeling their mouths." This spectacle, strange as it must have appeared, was hardly more so than the adventure of the following morning, when Captain Hannay "was awoke by the boatmen calling to the fish to participate in their meal."

On the 1st of December the expedition arrived at *Tsampaynago*, which has been before mentioned as the limit, beyond which, even natives of the country are not permitted to proceed without an express order from the Government. The custom-house or thana is on the right bank of the river, and *Male myu* which is close to it, contains about 800 houses with many very handsome gilded temples.

The Myothagyi or deputy governor of the town, is also the custom officer, and a tax of 15 ticals per boat is levied on the Chinese coming from *Bamo*. Old *Tsampaynago myo* is situated at the mouth of a small river which flows from *Mogout* and *Kyatpen*, and falls into the *Irawadi* immediately opposite the modern choki of that name. The sites of *Mogout* and *Kyatpen*, where some of the finest rubies of the kingdom are obtained, were pointed out to Captain HANNAY as lying in a direction N. 80° E. of *Tsampaynago*, and about 30 or 40 miles distant, immediately behind a very conspicuous peak called Shuen Toung, which he estimated at 3,000 feet high. The *Madara* river, as well as that of *Tsampaynago*, flows from the same mineral district which must greatly facilitate communication with it. The inhabitants of the country were unwilling or afraid to communicate any information regarding these secluded spots, and their exact locality is still a subject of conjecture. The mines are described as in a very swampy situation, and surrounded at a trifling distance by lofty hills. The three places at which the gems are principally sought, are *Mogout*, *Kyatpen* and *Loungtke*, and the principal miners are Kathays or Manipuris, with a few Chinese and Shans. The other most celebrated spot is *Momeit*, the site of which BUCHANAN found some difficulty in determining, but which Captain HANNAY learnt was not more than two or three days' journey, or between 20 or 30 miles north of *Mogout* and *Kyatpen*. While at this place Captain HANNAY says, " they heard the people who were cutting bambus in the hills, rolling bundles of them down the face of the steep. Having made a road by felling the trees, the woodmen allow bundles of 150 and 200 bambus to find their way to the bottom, which they do with a noise that is heard at the distance of eight miles. They are then floated down the small river into the *Irawadi*, but this operation can only be effected during the rains." The party now began to feel the cold excessively, and its severity was greatly heightened by a strong northerly wind, which seldom subsided until the afternoon, and was particularly keen in the narrow passes or *kyouk-dwens*.

Tagoung Myu, which was reached on the 5th of December, is an object of peculiar interest, as it is said to have been built by a king from Western India, whose descendants afterwards founded the kingdoms of *Prome*, *Pagan* and *Ava*. Captain HANNAY found the walls of the old fort dwindled away to a mere mound, and hardly discernible from the jungle with which they were covered; but adds, " that enough is still seen to convince one that such a place did formerly exist. The fort has evidently been parallel with the river, and is on the left bank which is high and composed of sandstone. About half a mile inland, the remains of the inner walls run north and south, with an opening or gap to the east, in which there is an appearance of a considerable ditch, which I was told is filled with water in the height of the rains. The whole has more the appearance of an old brick fort, than any thing I have seen in *Burmah*, and I should say it had been built by a people different from the present race of Burmans."

About a mile to the south of *Tagoung* are the extensive ruins of *Pagan*, which stretch as far as the eye can reach, and here Captain Hannay discovered impressions of Hindu Buddhist images, stamped upon a peculiar kind of brick composition (terra cotta), and with inscriptions which he imagined to be written in some variety of the Deva-nagri character. The Burmese on the spot were unable to explain their nature or origin, and the learning of an aged priest proved equally incompetent to the task of deciphering them :—they were subsequently, however, submitted to some Burman antiquarians at the capital, by the Resident, whose paper on the subject and a drawing of the images appeared in the 51st No. of the Journal of the Asiatic Society.

At *Shwezi-goung*, a large pagoda among the ruins of *Tagoung*, Captain Hannay obtained an extensive view of the subjacent country, and more accurate information of the site of the celebrated mines of *Momeit* than had been practicable at an earlier period of his voyage. From these accounts it appears that the locality which is said to produce the finest rubies in the kingdom, is about forty-five or fifty miles east of *Tagoung Myu*, from whence it can be reached by a foot traveller in three or four days, and by a laden bullock in ten. A drove of these animals was just about to leave *Tagoung* for *Momeit* on Captain Hannay's arrival, and from the owners he learnt "that after selling their *ngapee* (potted fish) at *Momeit*, *Mogout* and *Kyatpen*, they proceeded to the country of the Palongs, which bounds the district of *Momeit* on the east, and purchase tea, both pickled and formed into balls, a part of which is brought to *Ava*." The fish, which apparently forms the staple of the trade, is said to be of a remarkably fine description, and is dried in a manner peculiar to *Tagoung*.

On the left bank of the river, between *Henga-myo* and *Tagoung*, the teak tree first begins to appear, and at *Kyundoung* on the opposite side, it is said, that timber is found sufficiently large to form a boat from a single tree; it grows principally on the western face of the hills, at whose eastern base *Kyundoung* stands. A delay of two days at this village enabled Captain HANNAY to ascend to the summit of the first range of hills, by the road which leads across them to the valley of the *Mu* river: he found it a well-beaten track and great thoroughfare, by which the inhabitants of the country as far west as *Wantha Myu*, are accustomed to convey their supplies of fish, salt and oil from *Kyundoung*, a place apparently of some trade: the bazar contained 50 shops which were large and supplied with British piece goods, uncleaned cotton, silk, and cotton Burman dresses, coarse white cloth and other articles of country manufacture. "Besides these," adds Captain HANNAY, "I saw three Chinese shops, where spirits and pork were sold. The streets were crowded with people from the interior, who had come to make purchases, and amongst them were several Kadús, a race of people of a different origin from the Burmahs, and scattered over the tract of country between this and *Mogaung*. They are most numerous in the districts of *Manli* and *Mankat* situated on the *Meza* river* which comes from the north and west, and runs between the *Kyundoung* range and that called the *Thegyain* range, still seven or eight miles north of our present position. Rice, being the staple of the country, is an article of barter, and is sent in considerable quantities to *Ava*. Cotton, brought from the interior, is also an article of barter, and a good deal of it is sent to *Bamo*, but a part of it is made into cloth on the spot, as I saw several looms at work. Yellow and red cotton handkerchiefs of British manufacture sell here for two ticals a piece, which is about 100 per cent. beyond the price at *Ava*."

To this point of their progress, no diminution in the volume of the *Irawadi* was perceptible, and the channels proved sufficiently deep for the passage of large boats, from which we may infer that all the principal feeders or affluents, which pour their tributary streams into the *Irawadi* were still further north, and had not yet been reached. The first of any importance noticed is, the *Shue li khyoung* on the left bank, the northern branch of which flows from the Chinese frontier town of *Santa-fu*, called by the Burmahs *Mola Santa*, and a southern branch from *Momeit*, the site of the celebrated ruby mines already noticed: the confluence of these streams is represented as occurring at the village of *Laha* about 40 miles from the *Irawad*

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* A small stream not more than fifty yards broad, with but little water.

Neither branch can be of any magnitude, for Captain HANNAY remarks that at the point of junction with the *Irawadi*, the breadth of the *Shueli* is not more than 300 yards, and that it contained but little water,—a satisfactory proof that, this stream can have no connexion with the *Tsanpo* of *Thibet*.

At *Yebouk yua*, a day's journey above the *Shue khyoung*, two boats passed the party with Chinese in them from *Bamo*. "They work their boats which are of the Burman round-shaped flat-bottomed description, and seem to be of a tolerable size, as there must have been at least twenty men in each. These boats are particularly well adapted for the navigation of the *Irawadi*, as they do not draw more than 18 inches of water."

On the 13th of December the party reached *Katha*, a town of some extent on the right bank of the river, containing about 400 houses, and a population whose numbers appear to be annually increased by large parties who come from the interior, and take up a temporary abode on the right bank of the river, and on the numerous islands and shoals in its bed, for the purpose of fishing and traffic: at the close of the season they return to their respective homes in time for the resumption of agricultural labour, and a traveller ignorant of this nomade custom, which appears to be very general in the upper part of the *Irawadi*, would form an exaggerated estimate of the population of the towns and villages in which they are thus temporarily congregated. "The bazar of *Katha* was well supplied with good native vegetables of various sorts, fresh and saltfish, pork sold by Chinamen, dried cocoanuts, sugar-cane, and rice from the coarsest to the best quality, the latter selling at 15 ticals a hundred baskets." Captain HANNAY also saw a small quantity of stick lac in the bazar, but it was dear, and of a description very inferior, to that which is procurable at *Rangun*, and is brought from the Shan territory east of *Ava*. Even at this remote spot there was a 'tolerable display' of British piece goods, but not nearly to the extent noticed at *Kyundoung*. Captain HANNAY mentions a *Kyoung* or monastery recently erected by the Myothagi of *Katha*, as one of the most remarkable objects of the place. "It is a large wooden building covered with beautiful carved work, and situated near the river. The grounds surrounding it are extensive, and very tastefully laid out with fruit trees and flowery shrubs, amongst which I saw the Chinese rose in great plenty." The river is here confined by lofty banks not more than two furlongs apart, but the stream is very deep, and the spot appears to be a particularly favorable one for obtaining a good section of the river, the velocity of which at *Wagyih*, a village above *Katha*, Captain HANNAY estimated at one mile and a half an hour, with an average depth of 18 feet. This would give a discharge of about 52,272 cubic feet per second, while that of the *Ganges* at the same season may be assumed on RENNELL's authority at 80,000 feet per second, giving for both a proportion of 1 to 1.53. No satisfactory comparison can, however, be yet instituted between these magnificent rivers, for up to the present moment we are without a single section of the *Irawadi*, which could be safely assumed as the basis of a calculation sufficiently accurate for such a purpose.

At *Kyouk-gyih*, which the party reached on the 17th, they had fairly entered the remarkable curve in the *Irawadi* which had been previously represented in all our sketches of the river, and served, in the absence of more accurate information, as a point of reference, generally well known to the Burmahs and Shans. Here there is a ledge of rocks, over which the stream passes with so great a degree of rapidity, as to render it very difficult of navigation during the rains. The rocks are serpentine and the sand collected amongst them appeared to be a mixture of small garnets and iron sand. The right bank of the river, for two miles below *Kyouk-gyih*, is composed of small round stones and sand, and Captain HANNAY was told that the natives wash the soil for gold.

No circumstance throughout this voyage afforded a more gratifying proof of the friendly feeling generally of the Burmese authorities, than the attentions which Captain HANNAY received at every place at which they halted. Houses were erected for his accommodation at the various stages of the route, differing in no respect from those intended for the Myuwun of *Mogaung*; presents of fruit, rice, and vegetables were daily made to himself and followers, and the supposed tedium of his evenings was relieved by a band of singers and dancers, who are found at almost every town and village in the Burman empire. At *Kyouk-gyih*, these attentions were shewn to a very remarkable degree by the Woon of *Munyen*, " whose civility," says Captain HANNAY, " was the subject of conversation with every one in the fleet."

" Every individual has received sufficient rice and fish for two days' supply, and my boat was filled by him with all sorts of provisions, enough certainly to last myself and my followers for a week." The house of this liberal Woon, Captain HANNAY describes " as a very neat and comfortable dwelling, with a remarkably clean compound, in which there is a garden laid out with a great deal of taste, and, besides many articles of costly Burman household furniture, he has a number of very fine muskets and other arms." The party had now approached within a comparatively short distance of *Bamo*, and the vicinity of this celebrated mart was shewn, in more numerous villages than had been seen for several preceding days. From *Shuegu Myu* to *Balet*, a distance of three miles, the houses appeared to extend in an uninterrupted line, and *Kywun-do*, the name of a celebrated island in the river, covered with 100 pagodas, is most conveniently situated between these towns, the inhabitants of which hold their principal festivals upon it, at particular seasons of the year.

Near this spot, is the entrance to the second *kyouk-dwen*, the scenery of which appears to be very magnificent, and is thus described by Captain Hannay. " The river passes directly through the hills, which rise perpendicularly on both sides to the height of 400 feet; they are rocky, and of irregular and singular forms, having at the same time a sufficient number of trees on them to render the scenery very striking. One part of the range, on the right bank, rises as perpendicularly as a wall to the height of 500 feet, forming a grand and terrific precipice. This *kyouk-dwen* extends for four miles, and the hills which form it, are throughout of a rocky nature. The upper part of them appeared to be sandstone, resting on a base of blue-coloured limestone, mixed with veins of beautiful white marble ; and at one spot I saw large masses of compact and foliated primitive limestone, along with calcarious spar in large pieces."

Koung-toun, which the mission reached on the 20th, is said to contain about 200 houses, and is noted for the defence made by its Burmese garrison, against a large invading force of Chinese during the last war between these two nations. A ditch surrounds the town, and the remains of a brick redoubt, loop-holed for arrows or musquetry are still perceptible encircling a pagoda. " This is now all that is to be seen," adds Captain Hannay, " of the old fortification, but the town is still surrounded by a double palisade of bambus with sharp stakes placed between them." These defences are intended for the protection of the inhabitants against the Kakhyens, a tribe occupying the hills to the east, who frequently come down in small bodies for the purpose of carrying off cattle. Captain Hannay saw a great number of this tribe at *Koung-toun*, where they barter their rice and cotton for salt and *gnapee* (potted fish), and describes them, with few exceptions, as perfect savages in their appearance; their cast of countenance forms a singular exception to the general rule, for it is not at all Tartar in its shape, but they have, on the contrary, "long faces and straight noses, with a very disagreeable expression about the eyes, which was rendered still more so by their lanky black hair being brought over the forehead so as entirely to cover it, and then cut straight across on a line with the eyebrows. These people, though surrounded by Shans, Burmese and Chinese, are so totally different from either, that it is difficult to imagine from whence they have had their origin."

On the 20th of December the fleet moored at a village about five miles below *Bamo,* which being a town of great importance, and the residence of an officer inferior in rank to the *Mogaung* Woon, some previous arrangements were necessary to enable the latter to land with the eclât due to his rank. On reaching the town late on the following day, they found the left bank on which it stands so precipitous, that they were compelled to cross to the opposite side of the river, and a feeling of jealousy having arisen between the two Woons of *Mogoung* and *Bamo,* the former resumed his journey on the 22d, which compelled Captain HANNAY to defer the inquiries he was so anxious to make until his return in April, when he found the people far more communicative than they had ventured to be in the presence of the *Mogaung* Woon. The information obtained on both occasions will be more advantageously shewn in a connected form than in the detached portions in which it necessarily appears in his journal, and Captain HANNAY's first remark solves a difficulty, which, like the Adria of ancient history, has proved a stumbling block to modern investigation. In the course of inquiry into the sites of the principal towns on the *Irawadi* river, that of *Bamo* naturally held a very prominent place, and some of the native Shāns, who were questioned on the subject affirmed that it was on the bank of the *Irawadi* river, while others, whose opportunities of acquiring information had been equally good, positively denied this statement, and fixed its position on the left bank of a small stream which flows into the *Irawadi,* about a mile above the present town. Captain HANNAY reconciles the conflicting statements, briefly but satisfactorily, in the following remark:—

"I find that this is a *modern* town erected on the banks of the *Irawadi,* for the convenience of water-carriage between it and *Ava.* The *old* Shan town of *Manmo,* or *Bamo,* is situated two days journey up the *Tapan* river, which falls into the *Irawadi* about a mile above the new town of *Bamo* or *Zee-theet-zeit,* or new mart landing-place."

"This modern town," says Captain HANNAY, "is situated on high unequal ground, and the bank towards the river is from 40 to 50 feet in height, and composed of clay. With the exception of *Ava* and *Rangun* it is the largest place I have seen in Burmah, and, not excepting these places, I certainly think it the most interesting. The novelty of so large a fleet as ours passing up (and no doubt, having heard that a European officer was of the party) had attracted a great crowd of people to the river side, and on landing, I felt as if I were almost in a civilized land again, when I found myself amongst fair complexioned people, wearing jackets and trowsers, after being accustomed to the harsh features and party-colored dress of the Burmans. The people I saw were Chinese from the province of *Yunan*, and Shans from the Shan provinces subject to *China*. *Bamo* is said to contain 1500 houses, but including several villages which join it, I should say it contained 2000 at least, 200 of which are inhabited by Chinese. Besides the permanent population of *Bamo*, there are always a great number of strangers there, Chinese, Shans, and Kakhyens, who either come to make purchases or to be hired as workmen. There are also a great number of Assamese both in the town and in the villages immediately connected with it, amongst whom are several members of the *Tapan* or *Assam* Raja's family. *Bamo* is the jaghire of the *Tapan* Raja's sister, who is one of the ladies of the king of *Ava*.

"The inhabitants of this district live in large comfortable houses, which are thatched with grass, and walls made of reeds. They are generally railed in, and all the villages have bambu palisades surrounding them. The Palongs of the Chinese frontier are, I am told, remarkably industrious. They are good dyers, carpenters and blacksmiths, and all the *dhas* or swords used in this part of the country are made by them." "I received," adds Captain Hannay, "great attention from the Myuwun of *Bamo*, and also from the head Chinese there; they sent me tea, sugar, dried fruits, and vegetables, for which I, of course, made a suitable return. The annual caravan from *China* had not arrived, and the supply of Chinese articles in the shops was very small."

The people of *Bamo* were so strongly impressed with the idea that Captain Hannay's only object was to find a road by which British troops might penetrate to *China*, that he found it extremely difficult to obtain any information from them regarding the routes into that country. The Chinese themselves, however, proved more communicative, and from them he learnt the existence of several passes from *Bamo* into *Yunan*; but as one of these presents far greater facilities of transit than the others, it is generally adopted for commercial intercourse, and the mode of carrying it on is thus described. "At the distance of two miles* above *Bamo* the mouth of the *Taping* or *Tapan* river is situated. This river has a direction N. 70 E. for about two days' journey, when it cuts through the Kakhyen range, and under these hills, old *Bamo*, or *Manmo*, is situated. To the latter place the Chinese take their merchandise from modern *Bamo* by water, and then proceed overland to the choki or *ken* of *Loailong* near *Mowan*, which they reach in three days, and from thence to *Mounyen* or *Tengyechew* in the province of *Yunan*, at which place they arrive in eight or nine days. The road from *Bamo* to *Loailong* is through the hills, which are inhabited by Kakhyens and Palongs, after which it passes through the country of the Shans, called by the Burmans, *Kopyi-doung*. The road is described as being very good, and quite a thoroughfare. The *Tapan Khyoung* is not navigable for large boats, in consequence of which the Chinese use two canoes tied together, with a platform over them, for the transport of their merchandise to *Manmo* or old *Bamo*, and for the remainder of the journey it is carried on ponies or mules."

This description of the size of the *Tapan Khyoung*, which is also called by the Shans *Numtaping*, completely sets at rest the keenly agitated question of its identity with the *Tsanpo* of *Thibet*, and the theory of Klaproth (who, on the authority of Chinese writers, calls it the *Pinglankhyoung*, and maintains it to be the prolongation of the *Tsanpo)*, is shown to have no better foundation than his unauthorized change in the position assigned to the latter river, in that part of its course which passes through *Thibet*. Captain Hannay describes the *Taping* as not more than 150 yards broad, and with only sufficient water to float a small boat. The Singphos affirm that it is a branch of the *Shueli Khyoung* (the *Lungshue kiang* of the Chinese) from which it separates above *Momein*, but the accuracy of this report appears highly questionable.

The principal article of trade, which is cotton, is entirely in the hands of the Chinese, who arrive at *Bamo* in the months of December and January. The greater part of their imports is taken to *Ava*, as neither the natives of *Mogaung* nor *Bamo* could afford to purchase them. "What they dispose of here," says Captain Hannay, "are copper pots, carpets and warm jackets." These articles are also taken all over the Burman territories, as far west as the *Khyendwen*. There are several cotton godowns here, belonging to the Chinese, and there are constantly residing in the town 500 of these people, which, with the numerous arrivals from different parts of the country, gives the place a very business-like appearance, and there is of course a good bazar." There is a very neat temple built by the Chinese of *Bamo*, which Captain HANNAY visited, and was most politely received by the officiating priest. "On entering his house," says Captain HANNAY, "he rose to meet me, saluted me in the English fashion, asked me to sit down, and ordered his people to bring me tea; after which he sent a person with me to shew me the curiosities of the temple. Most of the figures were carved on wood, and different from what I have generally seen in Chinese temples; one of them represented the *Nursings* of the Hindus. The Chinese of *Bamo*, although different from the maritime Chinese, in language and features, have still the same idea of neatness and comfort, and their manners and mode of living appear to be much the same."

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* In another place it is mentioned as only one mile above *Bamo*.

"Their temple and all the houses, which are not temporary, are substantially built of bricks stained blue; the streets are paved with the same material, and the grounds of the temple are surrounded by a neat brick wall covered with tiles." "Besides the trade carried on at *Bamo* by the Chinese, the Shans, Palongs, and Singphos under *China*, are great purchasers of salt, *gnapee*, dried fish, and rice, but particularly salt, which is in constant demand; and to procure it, numbers of the above named people come to *Bamo*, *Sambaungys* and *Kountoung*. The salt which sells here for twenty ticals of silver for 100 vis, or 28 rupees for 150 seers, is brought principally from *Sheinmaga* above *Ava*, and from *Manbu*, which is situated two marches west of *Katha*. The Shans here are distinguished by their fair complexions and broad good-tempered faces. They wear turbans and trowsers of light blue cotton cloth; they greatly resemble the Chinese, and from living so near that nation, many of them speak the *Yunan*-Chinese language. They inhabit the country to the east of *Bamo*, and their principal towns are *Hotha*, *Latha*, *Santa*, *Sanla*, *Moongsye*, *Moong-woon*, *Moong-man*, *Moong-la*, and *Moong-tye*. The people are generally designated Shan Taroup or Chinese Shans."

"Although the Palongs speak the Shan, their own native language is a distinct one. The men, though small in stature, are athletic and remarkably well made. Flat noses and grey eyes are very common amongst them. They wear their hair tied in a knot on the right side of the head, and dress in a turban, jacket, and trowsers, of dark blue cloth. They are a hill people, and live in the tract of country situated between *Burmah* and *China*, but those to the east of *Bamo* pay no revenue to either country, and are governed by their own

Tsobuas. The Singpho traders I saw at *Bamo* were very different from those under *Burmah,* and according to their proximity to either Shans or Chinese, they assimilate to one or other in dress and language."

"The whole of these people," says Captain Hannay, "pay for every thing they require in silver; and were it not for the restrictions in *Burmah* on the exportation of silver, I think an intelligent British merchant would find it very profitable to settle at *Bamo*; as, besides the easy intercourse with *China,* it is surrounded by numerous and industrious tribes, who would, no doubt, soon acquire a taste for British manufactures, which are at present quite unknown to them." The revenue of the district is estimated by Captain Hannay at three lakhs of rupees per annum; and he adds, "If appearance of comfort may be taken as a proof of its prosperity, the inhabitants of *Bamo* shew it in their dress and houses. I have seen more gold and silver ornaments worn here than in any town in *Burmah.*"

On leaving *Bamo,* the appearance of the country became much more hilly, and great precautions were taken to guard against surprise by the Kakhyens, who inhabited the different ranges in the vicinity of the river.

At *Hakan* the escort was reinforced by 150 soldiers from *Bamo,* and a number of families who were proceeding up the river, joined the fleet to enjoy the protection afforded by so large a convoy. The Shans who composed the quota from *Bamo* were a remarkably fine set of men from the banks of the *Tapan Khyoung,* and formed a striking contrast, in dress and appearance, to the miserable escort which had accompanied the party from *Ava.*

At the village of *Thaphan-beng* they entered the third *Kyouk-dwen* from which a very beautiful view is obtained of the fertile valley of *Bamo,* bounded on the east by the Kakhyen hills, which are cultivated to their summits. Serpentine and limestone were the principal rocks found in this defile, as well as the preceding one; and as the river was here in some places not more than 80 yards broad, with a depth of 30 feet, and its rise is in the rains 50 feet above the present level, the rush of waters must at that season be terrific. The natives, indeed, declared, that the roar at that time was so great, as to prevent them from hearing each other speak, and that the defile could only then be traversed on rafts: now, however, it coursed gently along with an almost imperceptible motion.

At *Thabyebeng-yua* they found a new race of people called Phwons, who described themselves as having originally come from a country to the north-east, called *Motoung Maolong*, the precise situation of which could not be ascertained. Their native language, which they speak only in intercourse with each other, differs altogether from the Shan and Burmese, but they have no written character. There appear to be two tribes of this race, distinguished by the Burmahs as the great and small:—The former are found only at *Tshenbo* and in the vicinity of the third *Kyouk-dwen*, while the inferior tribe is scattered all over the country: the only difference apparently between them consists in some trifling varieties in the dialects they speak. Their extensive cultivation proved their agricultural industry, and four Chinese Shans were constantly employed in manufacturing their implements of husbandry. Their houses were of a construction totally different from any that had been previously seen, and consisted of a long thatched roof rounded at the ends and reaching almost to the ground. Inside of this and at the height of eight or ten feet from the ground, the different apartments are formed, the walls of which are made of mat.

"From the outward appearance of these houses," says Captain HANNAY, "it would be difficult to imagine that they were habitations, but inside they are very comfortable, and from the great thickness and peculiar form of the roof, the inmates cannot be much affected either by heat or cold." The same description of house is built by the Shans occupying the valley of *Kubo*, and it is probable that the Phwons have adopted this style of building from some tribe of that widely scattered nation.

On the 26th the fleet reached a part of the *Irawadi*, which is considered the most dangerous point in its navigation. It is called *Pusku*, and the stream is there confined to a breadth of 30 yards, but with no less than nine fathoms of depth in the centre. The rocks bore every appearance of fierce and irregular volcanic action, varying in color "from brown, yellow, red and green, to a jet black which shone like a looking glass." The strata also presented a scene of great confusion, some being vertical, some horizontal, and others twisted; "the whole having exactly the appearance of having been poured out from a furnace."

The navigation of the *Irawadi* river up to this point had been unmarked by difficulties of any magnitude, and, with the exception of the passes through the *Kyouk-dwens*, the channel appears to have afforded, even at that season of the year, an abundant supply of water for the largest class of boats, which ply between *Ava* and *Bamo*: above the village of *Namhet*, however, they first met a succession of rapids extending for a mile and a half, which were even then considered dangerous; and Captain HANNAY remarks, that he had seldom seen in the worst season, and worst part of the *Ganges*, a stronger current, or more turbulent water than at the rapids of *Shuegyain-man*, a short distance above the village of *Namhet*.

On the arrival of the fleet at *Tshenbo*, which is about 10 miles below the mouth of the *Mogaung* river, the boats by which the party had been conveyed from *Ava* were exchanged for others of a smaller description, better adapted for the navigation of so small and tortuous a river as that of *Mogaung*. The one prepared for Captain HANNAY's accommodation was of the kind called by the Burmese "*loung*:" it was paddled by 25 men, and formed of a single tree, with the addition of a plank 10 inches broad, all round the upper part of it.

Before quitting *Tshenbo*, Captain HANNAY had a visit from the head priest, whose curiosity to obtain some knowledge of European customs and habits could only be satisfied by the display of the contents of his trunks, and the sight of his watch, sextant, and thermometer; all of which he was permitted to examine by Captain HANNAY, who regrets that he had not brought some missionary tracts with him from *Ava* "to give this inquisitive priest some idea of the Christian religion." *Tshenbo*, on the authority of this priest, is said to have been formerly a principal city of the Phwon tribe, who were dispossessed of it, about sixty years ago, by the Burmahs.

On the last day of December the mission reached the mouth of the *Mogaung* river, which Captain HANNAY ascertained by observation to be in latitude 24° 56′ 53″. Here they were to quit the *Irawadi*, which, says Captain HANNAY "is still a fine river flowing in a reach from the eastward half a mile broad, at the rate of two miles an hour, and with a depth varying from three fathoms in the centre to two at the edge."

The *Mogaung* river on which the town of the same name is situated, is not more than 100 yards wide, and the navigation is impeded by a succession of rapids over which the stream rushes with considerable velocity. The smallest boat in the fleet was an hour and a half getting over the first of these obstacles, and the Shan boatmen, who are thoroughly acquainted with the character of the river, "pull their boats close to the rocky points, and then, using all their strength, shoot across to the opposite side before the force of the stream had time to throw them on the rocks." The Burmah boatmen adopted the apparently easier method of pulling their boats up along the edge of the stream, but this proved both difficult and dangerous, one boat being upset and a man drowned. The banks of the river were covered with a dense and impervious jungle, which extended nearly the whole way to *Mogaung*, and no village served to beguile the wearisome monotony of this portion of the journey, until they reached *Akouktoung*, a small hamlet on the right bank inhabited by Phwons and Shans. Here they met a chief of the *Lephaes* Singphos, who had taken up his residence in this village with a few followers, in consequence of a feud with some neighbouring tribes in his own country to the north. Between *Akouk-yua* and *Tapoh* (the next village seen) the bed of the river is filled with rocks and rapids, which render the navigation exceedingly dangerous, the stream shooting over them with such velocity as frequently to rise above the bow of the boat, which, in case of unskilful management, would be instantly upset. The way in which the Phwons and Shans overcome these difficulties, formed a striking contrast to the conduct of the Burmah and Kathay boatmen. The former working together with life and spirit, still paid the strictest attention to the orders given by the head boatman; while the latter " who think," says Captain HANNAY, " that nothing can be done without noise, obey no one, as they all talk at once, and use the most abusive language to each other." He thinks the Phwons and Shans greatly superior to the Burmahs or Kathays,— meaning by the latter those Manipuris resident in *Ava*, who are Burmans in every thing but origin.

After passing the last rapids at *Tapoh* the river expands in breadth to 200 yards; the stream flows with a gentle current, and " the bed is composed of round stones which are mostly quartz. Amongst them, however, there are found massive pieces of pure crystal stone, partaking of the nature of talc, and also pieces of indurated clay of different colours. The banks are alluvial on the surface, but towards the base and near the edge of the river the soil becomes gravelly, and in some places has a stratum of beautiful bright yellow-coloured clay intersecting it."

On the 5th of January the party disembarked from their boats, and as the Myo-wun was to be installed in his new government, the landing was effected with considerable state. " Arrangements," says Capt. HANNAY, " had been made for our reception, and on first landing we entered a temporary house where some religious ceremony was performed, part of which was the Myo-wun supplicating the spirits of three brothers who are buried here, and who founded the Shan provinces of *Khanti*, *Assam*, and *Mogaung*, to preserve him from all evil. After which ceremony he dressed himself in his robe of state, and he and I proceeded hand in hand through a street of Burman soldiers, who were posted from the landing place to the Myo-wun's house, a distance of nearly a mile: we were preceded by the Myo-wun's people carrying spears, gilt chattas, &c. and at intervals during our walk, a man in a very tolerable voice, chaunted our praises, and the cause of our coming to *Mogaung*. Several women also joined the procession, carrying offerings of flowers and giving us their good wishes."

The Myo-wun appears to have lost no time in availing himself of the advantages of his situation, for on the very day after landing, he commenced a system of unsparing taxation, to enable him to pay for his appointment. A rapid succession of governors within a very few years, all influenced by the same principle, had already reduced the inhabitants of *Mogaung* to a state closely bordering on extreme poverty, and the distress occasioned by the exactions now practised was bitterly complained of by the wretched victims of such heartless extortion. The Shan inhabitants of the town were employed by the Burmese officers to enforce this excessive payment of tribute from the Singphos and Kakhyens of the surrounding hills, which had led to much ill-will on the part of the latter, by whom they are stigmatised "as the dogs of the Burmans."

"The town of *Mogaung*," says Captain Hannay, "is situated at the junction of the *Namyeen* or *Namyang*, and the *Mogaung* or *Numkong* rivers, and extends about a mile from east to west along the bank of the last named river, the west end of the town being bounded by the *Namyeen khyoung*, which comes from the district of *Monyeen* in a direction S. 43 W. The town of *Mogaung*, strictly speaking, is confined within what is now only the remains of a timber stockade. Outside of this, however, there are several houses, and within a short distance a few small villages are scattered about, but even including all these, there are not more than 300 houses. Those within the stockade are inhabited by Shans, and those outside by Burmans, Phwons, Assamese and a few Chinese. The latter to the number of fifty reside here, and are under the authority of a Thoogyee of their own nation;—they derive a profit from their countrymen who come annually in considerable numbers to purchase serpentine. Amongst them I saw both blacksmiths and carpenters, and, for the first time since leaving Gangetic India, I saw the operation performed of shoeing horses. The Shans, inside the stockade, reside in large houses, such as I formerly described having seen amongst the Phwons;—the Burmans and others live in the same description of houses as are to be seen in every part of *Burmah proper*, but all bear signs of great poverty; and if it were not for the Chinese, whose quarter of the town looks business-like and comfortable, I should say that *Mogaung* is decidedly the poorest-looking town I have seen since leaving *Ava*. There is no regular bazar, all supplies being brought from a distance, and the market people are, with few exceptions, Kakhyens and Assamese from the neighbouring villages."

The arrival at so remote a spot of a European officer was soon bruited abroad, and Captain Hannay's time was fully occupied in answering innumerable questions put to him by a crowd of visitors, who examined his sextant with great care, under the firm conviction that, by looking through it, he was enabled to perceive what was going on in distant countries;—nor would they believe that the card of his compass was not floating on water, until, to satisfy them, he had taken it to pieces. The paucity of inhabitants and poverty of the town plainly indicated the absence of extensive trade, and Captain Hannay learnt, that, including the profits derived from the sale of serpentine, the revenues of the town and neighbouring villages did not amount to more than 30,000 rupees per annum, and the Burmah authorities can only enforce the payment of tribute from the Shans of *Khanti*, and the Singphos of *Payendwen*, by the presence of an armed force. In their last attempt on the latter, a Burmah force of 1000 men was detached from *Mogaung*, of whom 900 were destroyed; and for ten years they had been held in salutary dread by the Burmah governors of the frontier. During his stay at *Mogaung*, Captain Hannay obtained specimens of the green stone, called by the Burmahs *kyouk-tsein*, and by the Chinese *yueesh*,[*] and which he supposes to be nephrite. "The Chinese," he says, "choose pieces which, although showing a rough and dingy-coloured exterior, have a considerable interior lustre, and very often contain spots and veins of a beautiful bright apple-green. These are carefully cut out, and made into ring stones, and other ornaments, which are worn as charms. The large masses are manufactured by them into bracelets, rings, and drinking cups, the latter being much in use amongst them, from the idea that the stone possesses medicinal virtues. All the *yueesh* taken away by the Chinese is brought from a spot five marches to the north-west of *Mogaung*, but it is found in several other parts of the country, although of an inferior quality. Serpentine and limestone are the prevailing formations of the base of the highest ranges of hills throughout this part of the country. Steatite is also abundant in the bed of the *Irawadi* below the valley of *Khanti*."

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[*] Monsieur Abel Re'musat, in the second part of his history of *Khotan*, is said by Klaproth (Mem. Rel. à l' Asié, tome 2, p. 299) to have entered into a very learned disquisition proving the identity of the *yu* or *yueesh* of the Chinese with the *jasper* of the ancients.—R. B. P.

The *yu* is a silicious mineral, coloured with less intensity but passing into heliotrope. It is therefore *prase* rather than *jade* or nephrite.—Ed.

One very important object of Captain HANNAY's mission was to cross the *Patkoi* mountains into *Assam*, and on his arrival at *Mogaung* he waited some days in considerable anxiety for the *Kakhyen* porters, who were to convey his baggage and supplies during the remaining portion of the journey :—he soon found, however, that the authority of the Burmans when unenforced by the presence of a large military detachment, was held in the most sovereign contempt by these hardy mountaineers, and after many fruitless attempts to induce the *Mogaung* woun to allow him to proceed with even a small party, he was constrained to limit his further researches to the *Hukong* valley and amber mines. Repeated remonstrances were necessary to induce the governor to proceed even so far, and it was not until the 19th of the month that an advanced guard crossed the river, and fired a feu de joie, after performing the ceremony of sacrificing a buffalo to the Nhatgyee (or spirits of the three brother Tsaubuas of *Mogaung*), without which no expedition ever marches from the town. Even then, the dogged obstinacy of the governor induced him to delay his departure, and it was not until Captain HANNAY threatened that he would instantly return to *Ava* if there were any longer delay, that the wily diplomatist could be induced to move.

On the 22d they crossed the river, and the camp was formed on the northern bank, in strict accordance with Burmese custom. Captain HANNAY's tent (a common sepoy's pál) was the admiration of every one but its owner, who now for the first time marched with an undisciplined rabble. "The soldiers' huts," says Captain HANNAY, "are composed of branches of trees and grass, and if they wish to be particular, they cover them with a piece of cloth, which is generally some old article of dress. The Myo-wun's station is in the centre of the camp, and in front of him are his own immediate followers, whose huts are formed into a street marked by a double line of spears. At the head of this street the flags are placed, and also the two small cannons (one-pounders), which are sent with the force, I believe, for the purpose of firing three rounds morning and evening, to frighten the neighbouring Kakhyens, and which ceremony, I suspect, will be gone through with as much gravity, as if it would have the desired effect. My position is in front and a little to the left of the Myo-wun and we are completely surrounded by the soldiers, whose huts are in distinct lines, the men of each district keeping together."

On the 22d they at length set out, and the style of march was a little in accordance with the military experience of our traveller, as the previous encampment. "The men, to the number of 800, march in single file, and each man occupies a space of six feet, being obliged to carry a bangy containing his provisions, cooking pots, &c. besides his musket, which is tied to the bangy stick. This is the most common mode of marching, but some of them carry their provisions in baskets, which they strap across their forehead and shoulders, leaving their hands free to *carry* their muskets; but as to *using* them it is out of the question, and I should say the whole party are quite at the mercy of any tribe who choose to make a sudden attack upon them." On reaching the encamping ground, however, these men gave proof how well they were adapted to this mode of travelling, for in an hour after their arrival, every individual had constructed a comfortable hut for himself, and was busily engaged cooking the rice, which, with the addition of a few leaves plucked from certain shrubs in the jungle, forms the diet of the Burman soldier on the line of march.

The tract of country through which the party passed on the first two days was hilly, and abounded in a variety of fine forest trees; but on approaching *Numpoung*, the second encampment, the country became more open, and the pathway led through a forest of very fine teak trees. The principal rivers all flowed from the *Shuedoung-gyi* range of hills on the east of their route, and are at this season of the year mere mountain torrents, with so little water in them, that the path frequently passes over their rocky beds. The whole route from *Mogaung* to the *Hukong* valley, may be described generally as passing between defiles, bounded by the inferior spurs of the *Shuedoung-gyi* range on the east, and numerous irregular hills on the west; these defiles form the natural channels of numerous streams, which, flowing from the heights above, and struggling amidst masses and boulders of detached rock, make their way eventually to the larger stream of the *Numkong*, which unites with the *Namyen* at *Mogaung*. The only traces of inhabitants perceptible in the greater part of this route were a few cleared spots on the hills in the vicinity of some scattered Kakhyen villages, and a few fishing stakes in the mountain streams. Near the mouth of the *Numsing Khyoung* the party met with a few Kakhyen huts, which appear to have been constructed by that tribe, during their fishing excursions; and at *Tsadozout*, an island in the bed of the *Mogaung* river, on which the force encamped on the 28th of January, they passed the sites of two Kakhyen villages, and found the ground completely strewed with graves for a considerable distance, the probable result of some endemic disease which induced the survivors to desert the spot. The finest lemon and citron trees, Captain HANNAY had ever seen, were found here, and the tea plant was also very plentiful—the leaf is large, and resembles that sold in *Ava* as pickled tea; the soil in which it grew most luxuriantly is described as of a "reddish-colored clay." Thus far, a considerable portion of the route had passed either directly over the bed of the *Mogaung* river or along its banks; but at *Tsadozout*, they crossed it for the last time, and at this spot it is described as a mere hill stream with a "bed composed of rolled pieces of sienite and serpentine, with scales of mica in it." The navigation of the river even for small canoes ceases below this spot, and those which had accompanied the party with supplies were left, from inability, to convey them further.

About four miles north of *Tsadozout* "the road ascends about 100 feet, and passes over a hilly tract, which seems to run across from the hills on the east to those on the west, and is called by the natives *Tsambu-toung* (the *Mount Samu* of the maps). This transverse ridge evidently forms the southern limit of the *Hukong* valley, and streams flow from it both to the north and south; the former making their way to the *Khyendwen*, and the latter to the *Mogaung* river.

"*Tsambu-toung*," says Captain HANNAY, "is covered with noble trees, many of which, I think, are sàl, and are of immense height and circumference. The tea-plant is also plentiful, besides a great variety of shrubs which are quite new to me. The rays of the sun seem never to penetrate to the soil of *Tsambu-toung*; it may therefore be easily imagined how damp and disagreeable it is, more particularly as there is a peculiar and offensive smell from a poisonous plant which grows in great abundance in this jungle, and the natives tell me that cattle die almost immediately after eating it."

On the 30th the party descended from the encampment on the northern face of this ridge, to the Singpho village of *Walobhum*, and finally encamped on the left bank of the *Edikhyoung*, about three furlongs distant from *Meinkhwon* or *Mungkhum*, the capital of the *Hukong* valley, "where," says Captain HANNAY, "our journey must end for the present; as, besides having no provisions, the men composing the force are so completely worn out with fatigue, that I am certain they could not proceed further without a halt of some days." This interval Captain HANNAY assiduously employed in collecting information regarding the valley, which had from a very early period been an object of great geographical interest, as the site of the *Payendwen* or amber mines, and at no very remote era probably formed the bed of an alpine lake, which, like that of the *Manipur* valley, has been subsequently raised to its present level by long continued alluvial deposits, and detritus, from the hills which encircle it on every side. The tendency of every such deposition is to raise the level of the water, and facilitate its drainage, until it becomes so shallow, that evaporation suffices to complete the process, and render the soil a fit abode for future races of men. The numerous and extensive lakes in the mountainous regions of *Thibet* and *Tartary* are doubtless undergoing a similar change, and no great stretch of imagination is necessary to anticipate the period when they will become the sites of extensive towns and villages, and present a striking contrast to the rugged magnificence and solitary grandeur of the snowy regions which surround them.

"The valley of *Hukony* or *Payendwen*," says Captain HANNAY, "is an extensive plain, bounded on all sides by hills; its extent from east to north-west being at least 50 miles, and varying in breadth from 45 to 15 miles, the broadest part being to the east. The hills bounding the valley to the east are a continuation of the *Shuedoung-gyi* range, which is high, commences at *Mogaung*, and seems to run in a direction of N. 15 E." The principal river of the valley is the *Numtunaee* or *Khyendwen*, which flows from the *Shuedoung-gyi* range, and after receiving the contributions of numerous small streams quits the valley at its north-western corner, and again enters the defiles of the hills, beyond which its course is no longer perceptible. On the western side of the valley there are but few villages, and these thinly inhabited, the capital itself containing not more than thirty houses; but the north and eastern sides are said to be very populous, the houses in those quarters being estimated at not less than 3000, nearly all of which are situated on the banks of the *Towang* and *Debee* rivers. All the low hills stretching from the western foot of the *Shuedoung* range were under cultivation, and the population is said to extend across to the banks of the *Irawadi*, in numbers sufficient to enable the Singphos when necessary to assemble a force of nine or ten thousand men.

"With the exception," says Captain HANNAY, "of the village of *Meinkhwon*, which has a Shan population, the whole of the inhabitants of the valley are Singphos and their Assamese slaves. Of the former, the larger proportion is composed of the Mrip and Tisan tribes, with a few of the Laphai clan, who are still regarded as strangers by the more ancient colonists, and can hardly be viewed but with hostile feelings, as this tribe have frequently ravaged *Meinkhwon* within the last six years, and were guilty of the still greater atrocity of burning a priest alive in his *kyoung* or monastery.

Formerly, the population was entirely Shan, and previous to the invasion of *Assam* by the Burmese, the town of *Meinkhwon* contained 1500 houses, and was governed by the chief of *Mogaung*. From that period, the exactions of the Burmese officers have led to extensive emigration, and to avoid the oppression to which they were hourly exposed, the Shans have sought an asylum in the remote glens and valleys on the banks of the *Khyendwen*, and the Singphos among the recesses of the mountains at the eastern extremity of the valley. This state of affairs has led to general anarchy, and feuds are constantly arising between the different tribes, which the quarrel of the Beesa and Dopha Gaums has greatly contributed to exasperate. No circumstance is more likely to check these feuds, and reclaim the scattered population of the valley, than the establishment of a profitable commercial intercourse with the more equitably governed valley of *Assam*, with which communication is now becoming more intimate than at any previous period.

Of the mineral productions of the *Hukong* valley, enumerated by Captain HANNAY, the principal are salt, gold, and amber: the former, he informs us, is procured "both on the north and south sides of the valley, and the waters of the *Namtwonkok* and *Edi* rivers are quite brackish from the numerous salt springs in their beds. Gold is found in most of the rivers, both in grains and in pieces the size of a large pea. The rivers which produce it in greatest quantity and of the best quality are the *Kapdúp* and the *Namkwùn*: the sand of the former is not worked for this mineral, I am told, but large pits are dug on its banks, where the gold is found, as above mentioned. Besides the amber, which is found in the Payen-toung, or amber mine hills, there is another place on the east side of the valley called *Kotah-bhum*, where it exists in great quantities, but I am informed that the spot is considered sacred by the Singphos, who will not allow the amber to be taken away, although it is of an inferior description." Specimens of coal, were also found by Captain HANNAY in the beds of the *Numbhyu* and *Edi* rivers; and he learnt from the natives that, in the *Numtarong*, a great quantity of fossil wood was procurable.

In its relation to *Assam* and *China*, the trade of the *Hukong* valley naturally attracted a share of Captain HANNAY's attention, and from his account it appears that "the only traffic of any consequence carried on in this valley is with the amber, which the Singphos sell to a few Chinese, Chinese-Shans, and Chinese Singphos, who find their way here annually. The price of the common or mixed amber is 2¼ ticals a vis or four rupees per one and a half seer: but the best kind and what is fit for ornaments, is expensive, varying in price according to its colour and transparency*."

"The Chinese sometimes pay in silver for the amber, but they also bring with them warm jackets, carpets, straw hats, copper pots, and opium, which they give in exchange for it. They also barter their merchandize for ivory and gold dust, but only in small quantities. A few individuals from the Burman territories likewise come here, with cloths of their own manufacture, and also a small quantity of British piece goods for sale. But as they are obliged on their way hither to pass through the country of the most uncivilized of the Kakhyen tribes, they seldom venture to come. The greatest part therefore of British and Burman manufactures which are used in this valley, are brought from *Mogaung* by Singpho merchants. But I understand that within the last few years, several of them have gone to *Assam* with gold dust, ivory, and a little silver, for which they receive in return muskets, cloths, spirits, and opium. The following is a list of British piece goods now selling at *Meinkhwon*—common book-muslin used as head dresses, 14 rupees a piece; coarse broad cloth worn as shawls, 2¼ yards long, 18 rupees each; good cotton handkerchiefs, 4 rupees a pair; and coarse ones, 2½ rupees a pair. These are the prices of goods bought at *Ava*, but what similar articles from *Assam* may cost, I cannot ascertain. The broad cloth, however, that I have seen from the latter place is of a very superior quality. The merchants who come to this valley from the Burman territories are natives of *Yo*, and the man who is now selling goods here has frequently visited *Calcutta*. The dress worn by the *Singphos* of this valley is similar to that of the Shans and Burmans of *Mogaung*, but they frequently wear jackets of red camlet, or different velvets which they ornament with buttons, and those who can afford it wear a broad-cloth shawl. The arms in common use amongst them are the *dhu* (or short sword) and spear. The women wear neat jackets of dark coarse cotton cloth, and their *thamines* or petticoats are full and fastened round the waist with a band, being altogether a much more modest dress than that worn by the Burman women. Those who are married, wear their hair tied on the crown of the head like the men, but the younger ones wear theirs tied close to the back of the neck, and fastened with silver pins—both married and single wear white muslin turbans. The ornaments generally worn by them are amber ear-rings, silver bracelets, and necklaces of beads, a good deal resembling coral, but of a yellowish colour, and these are so much prized by them that they sell here for their weight in gold."

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* Specimens in matrice are deposited in the Society's Museum.—Ed.

During his stay at *Hukong*, Captain HANNAY was visited by many Singphos from the borders of *China*, from whom he learnt that the *Sginmaekha* river rises in the mountains bounding the plain of *Khanti* to the north, and is inclosed on the east by the *Goulang-sigong* mountains, which they consider the boundary between *Burmah* and *China*. This river is, on the same authority, pronounced not to be navigable even for canoes, and the most satisfactory confirmation is afforded of the accounts of Captain WILCOX*. Several smaller streams fall into the *Sginmaekha* from the *Shuedoung-gyi* hills on the west, and the name of *Situng* is given to the tract of country through which they flow. In this district gold is very plentiful, and it is found, says Captain HANNAY, " over the whole tract of mountainous country, above the *Sginmaekha*. The Chinese visit this locality for the purpose of procuring the gold, and give in exchange for it, warm clothing, carpets and opium."

Of the several routes by which communication is kept up between the inhabitants of *Hukong* and the countries around, the principal appear to be, one leading across the *Shuedoung-gyi* range to the eastern Singphos; a second, called the *Lye-gnep-bhum* road, winds round the base of the mountain of that name, and leads in sixteen days to *Mung-lang*, the capital of the *Khanti* country, which was visited by Captain WILCOX.

The most important one, however, with reference to trade, lies in a south-east direction from the *Hukong* valley, from which the district of *Kakyo-wainmo* is not more than eight days' march distant. By this route the Chinese frequently travel, and it affords a very satisfactory proof that intercourse may be held direct with *China*, without the necessity of following the circuitous route by *Mogaung*.

Among the several races of people inhabiting the valleys through which the principal rivers flow, the Khantis or Khumptis hold a very conspicuous rank: they are represented as a fine, brave, and hardy race of men, and are held in great apprehension by the Burmahs, who, about three years ago, attempted to raise revenue amongst them: the force detached on this duty, however, met with such determined resistance, that it was compelled to return, and no subsequent attempt has been made on their independence. They are in constant communication with the Khunungs, a wild tribe inhabiting the mountains to the north and east, from whom they procure silver and iron. "The former is found in a mine, said to be situated on the northern side of the mountains, to the north-east of *Khanti*." All the information Captain HANNAY could obtain led him to suppose that this mine was worked by people subject to *China*, and from the description given, he thinks they are Lamas, or people of *Thibet*. The part of the Chinese territories north-east of *Khanti* is known at *Hukong* by the name of *Mungfan**, and the Khantis have no communication with it but through the Khunungs.

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* Although Captain WILCOX (As. Res. vol. xvii. p. 463), relying on the accounts given by Singphos of this river, appears to have formed rather an exaggerated estimate of *its size*, his conjectures as to the position of *its sources* are fully verified by the statements made to Captain HANNAY.—R. B. P.

From *Meingkhwon*, Captain HANNAY obtained a view of the hill, near which lie the sources of the *Uru* river, one of the principal affluents of the *Ningthi* or *Khyendwen:* it bore south 35° west from *Meingkhwon*, and was about 25 miles distant. It is in the vicinity of this spot that the most celebrated mines of serpentine are situated, and their position is thus described by Captain HANNAY.

"A line drawn from *Mogaung* in a direction of N. 55 W. and another from *Meingkhwon* N. 25 W. will give the position of the serpentine mine district. The Chinese frequently proceed to the mines by water for two days' journey up the *Mogaung* river, to a village called *Kammein*, at which place a small stream called *Engdau-khyoung*, falls into the *Mogaung* river. From thence a road leads along the *Engdau-khyoung* to a lake several miles in circumference called *Engdau-gyi*, and to the north of this lake eight or nine miles distant are the serpentine mines. The tract of country in which the serpentine is found extending 18 or 20 miles." There is, however, another more direct route from *Kam-mien* which runs in a north-westerly direction. The whole tract of country is hilly, and several hot and salt springs are reported to exist near the *Engdau-gyi* lake, which is said to cover what was once the site of a large Shan town called *Tumansye*. The natives affirm that it was destroyed by an earthquake, and from the description given of a hill in the vicinity, the catastrophe may have been produced by the immediate agency of volcanic action.

On the 21st of March, Captain HANNAY visited the amber mines, and his description is the first that has ever been given of the locality from whence the Burmans obtain this mineral.

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* In the second volume of DU HALDE's "China," p. 385, the Père Regis thus describes the tribe by which this tract of country is inhabited, and its geographical site:

"The most powerful among the Tartar Lamas are those called by the Chinese *Mung-fan*, who possess a wide territory in *Tibet*, north of *Li Kyang-lu-fu*, between the rivers *Kincha-kyang* and *Vu-lyangho*. This country was ceded to them by USANGHEY (whom the Manchews made king of *Yunan*) to engage them in his interest."—R. B. P.

" We set out at eight o'clock," he says, " in the morning, and returned at two P. M. To the foot of the hills the direction is about south 25 west, and the distance three miles, the last mile being through a thick grass jungle, after which there is an ascent of one hundred feet, where there is a sort of temple, at which the natives, on visiting the mines, make offerings to the ngats or spirits. About a hundred yards from this place, the marks of pits, where amber had been formerly dug for, are visible, but this side of the hill is now deserted, and we proceeded three miles further on to the place where the people are now employed in digging, and where the amber is most plentiful. The last three miles of our road led through a dense small tree jungle, and the pits and holes were so numerous that it was with difficulty we got on. The whole tract is a succession of small hillocks, the highest of which rise abruptly to the height of fifty feet, and amongst various shrubs which cover these hillocks the tea plant is very plentiful. The soil throughout is a reddish and yellow coloured clay, and the earth in those pits, which had been for sometime exposed to the air, had a smell of coal tar; whilst in those which had been recently opened, the soil had a fine aromatic smell. The pits vary from six to fifteen feet in depth, being, generally speaking, three feet square, and the soil is so stiff that it does not require propping up."

" I have no doubt," Captain HANNAY adds, " that my being accompanied by several Burmese officers, caused the people to secrete all the good amber they had found. For although they were at work in ten pits, I did not see a piece of amber worth having. The people employed in digging were a few Singphos from the borders of *China* and of this valley. On making inquiry regarding the cause of the alleged scarcity of amber, I was told that, want of people to dig for it was the principal cause; but I should think the inefficiency of the tools they use was the most plausible reason:—their only implements being a bambu sharpened at one end, and a small wooden shovel."

" The most favorable spots for digging are on such spaces on the sides of the small hillocks as are free from jungle, and I am told that the deeper the pits are dug, the finer the amber; and that that kind which is of a bright pale yellow, is only got at the depth of forty feet under ground."

A few days subsequent to this examination of the amber mines, Captain HANNAY visited the *Numtunaee* or *Khyendwen*, which flows through the valley about five miles north of *Meingkhwon* in this part of its course; and at this season of the year the stream, as might have been anticipated, is small, but in the rains Captain Hannay estimates that its breadth must be 300 yards from bank to bank, and it is navigable throughout the year for large canoes. An island in the centre of the bed was covered with the skeletons of large fish, which had been destroyed by the poisonous quality of the fallen leaves of overhanging trees:—the natives eat the fish so killed with impunity.

After waiting several days at *Meingkhwon*, in anticipation of the return of some messengers who had been sent into *Assam*, and suffering extreme inconvenience from the difficulty of procuring adequate supplies for the force, the Myo-wun began seriously to think of returning to *Mogaung*. All expectation of prosecuting the journey into *Assam* had been relinquished, and the Dupha Gaum having voluntarily come into the camp, was received by the Burman governor with a civility and distinction, extorted by his apprehension of the numerous Singphos ready to support their redoubtable chieftain, whose influence is said to extend to the frontiers of *China*. On the first of April the ceremony was performed of swearing in the different Tsobuas (tributary chiefs) to keep the peace, which is thus described by Captain Hannay.

"The ceremony commenced by killing a buffalo, which was effected with several strokes of a mallet, and the flesh of the animal was cut up to be cooked for the occasion. Each Tsobua then presented his sword and spear to the spirits of the three brother Tsobuas of *Mogaung*, who are supposed to accompany the governor of the above named place, and to inhabit three small huts which are erected on the edge of the camp. Offerings of rice, meat, &c. were made to these *ngats* or spirits, and on this being done, each person concerned in taking the oath received a small portion of rice in his hand; and in a kneeling posture, with his hands clasped above his head, heard the oaths read both in the Shan and Burmese languages. After this, the paper on which the oaths were written was burned to ashes, and mixed with water, when a cup full of the mixture was given to each of the Tsobuas to drink, who, before doing so, repeated an assurance that they would keep the oath, and the ceremony was concluded by the chiefs all sitting down together and eating out of the same dish." The chieftains to whom this oath of forbearance was administered were the Thogyee of *Meingkhwon*, a Shan—the Dupha Gaum, a *Tesan* Singpho—the Panwah Tsobua, a *Laphaee* Singpho—the Situngyen Gaum, and Weng-keng-moung, *Mirip* Singphos—and Tare-poung-noung, a *Tesan* Singpho,—all of whom, by this act, virtually acknowledged the supremacy of the Burman authorities, and their own subjection to the kingdom of *Ava.*

The new governor having succeeded by threats and the practice of every art of extortion, in raising as large a sum as it was possible to collect from the inhabitants of the valley and surrounding hills, announced his intention of returning to *Mogaung*; and on the 5th of April no intelligence having been received from *Assam*, Captain HANNAY left *Meingkhwon* on his return to *Ava*, with a very favorable impression of the Singphos he had seen, who appear to possess great capabilities of improvement, and whose worst qualities are represented as the natural result of the oppressive system of government under which they live. One of their chieftains in conversation with Captain HANNAY furnished a clue to the estimation in which they held the paramount authorities around them by the following remark. "The British," he said, "are honourable, and so are the Chinese. Among the Burmans you might possibly find one in a hundred, who, if well paid, would do justice to those under him. The Shans of *Mogaung*," he added "are the dogs of the Burmans, and the Assamese are worse than either, being the most dangerous back-biting race in existence."

On the 12th of April, Captain HANNAY reached *Mogaung*, and some boats arriving shortly afterwards from the serpentine mines, he availed himself of so favorable an opportunity of acquiring some additional information regarding that interesting locality. He found the boats laden with masses of the stone so large, as to require three men to lift them. The owners of the boats were respectable Chinese Musalmáns, who were extremely civil, and readily answered all the questions put to them by Captain HANNAY, who learnt "that, although the greater number of Chinese come by the route of *Santa* and *Tali*, still they are only the poorer classes who do so: the wealthier people come by *Bamo*, which is both the safest and the best route. The total number of Chinese and Chinese Shans who have this year visited the mines is 480."

"I have made every inquiry," adds Captain HANNAY, "regarding the duties levied on these people, both on their arrival here and on their purchasing the serpentine, and I am inclined to think that there is not much regularity in the taxes, a great deal depending on the value of the presents made to the head-man. Formerly, the Chinese were not allowed to go to the mines, but I understand the following is now the system carried on in this business.

"At particular seasons of the year, there are about 1000 men employed in digging for serpentine: they are Burmahs, Shans, Chinese-Shans, and Singphos. These people each pay a quarter of a tical a month, for being allowed to dig at the mines, and the produce of their labour is considered their own.

"The Chinese who come for the serpentine, on their arrival at *Mogaung*, each pay a tax of from 1¼ to 2¾ ticals of silver, for permission to proceed to the mines, and 1¼ ticals a month during their stay there. Another duty is levied on the boats or ponies employed in carrying away the serpentine, but this tax varies according to circumstances; and on the return of the Chinese to *Mogaung*, the serpentine is appraised and a tax of 10 per cent. taken on its value. The last duty levied is a quarter of a tical from every individual, on his arrival at the village of *Tapo*, and there the Chinese deliver up all the certificates they have had, granting them permission to proceed to the mines."

On the 9th of April, no intelligence having been received of the messengers sent into *Assam*, Captain Hannay determined to return to *Ava*, and, embarking on a small boat, he reached *Bamo* in eight days, and arrived at *Ava* on the 1st of May. The time occupied in returning from *Meingkhwon* to *Ava* was only eighteen days, while the journey to that frontier post was not completed in less than forty-six of actual travelling,—a very striking proof of the extreme difficulty of estimating the distance between remote points, by the number of days occupied in passing from one to the other, unless the circumstances under which the journey was made are particularly described. That portion of the route between *Meingkhwon* and *Beesa* in *Assam*, which Captain Hannay was prevented visiting, will probably in a short time be as well known as the territory he has already so successfully explored, and the researches in which he is now engaged, extending from *Beesa* in *Assam* to *Meingkhwon* in the *Hukong* valley, will complete the examination of a line of country not surpassed in interest by any, which our existing relations with the empire of *Ava* have afforded us an opportunity of visiting. His labours have filled the void necessarily left in the researches of Wilcox, Burlton, and Bedford, and have greatly contributed to dispel the doubt and uncertainty, which they had not the opportunity of removing. While the officers of the *Bengal* Presidency have been thus successfully engaged in geographical inquiries on the north of *Ava*, the south and western districts have been explored with equal zeal and intelligence by those of the *Madras* Presidency; and the spirit of honorable competition, which has already stimulated the researches of Drs. RICHARDSON and BAYFIELD, and Lieutenant MACLEOD, with such marked advantage, bids fair, in a comparatively short time, to render the whole empire of *Ava* better known than the most sanguine could have ventured to anticipate. Did the results of such journies and investigations tend only to an increase of our geographical knowledge, they would even then be most valuable: but to suppose that the consequences of this intercourse between intelligence and ignorance are so limited, is to take a most inadequate view of the subject: the confidence inspired by the visits and conduct of a single individual,* has already opened a communication between *Yunan* and *Moulmein*, and the caravans of *China* have commenced their annual visits to the British settlements on the coast: the journey of Captain HANNAY will in all probability lead to a similar result between *Assam* and the northern districts of *Yunan*; and the time may not be very distant, when British merchants located at *Bamo*, will, by their superior energy and resources, extend its now restricted trade to surrounding countries, and pave the way for ameliorating the condition and enlightening the ignorance of their numerous inhabitants.—*Journal of the Asiatic Society of Bengal* pp. 245-278.

4.—*Report on the Physical Condition of the Assam Tea Plant, with reference to Geological Structure, Soils, and Climate.—By* JOHN M'CLELLAND, *Esq., Assistant Surgeon, Bengal Establishment, and Member of the Asiatic and Medical Societies of Calcutta.—Presented to the Agricultural Society of Calcutta, 8th February,* 1837, *by desire of the Right Honourable Lord* AUCKLAND, *Governor General of India, &c. &c. &c.*

[We have been favoured by the talented author with an able pamphlet under the above title, which has been printed in Calcutta as the first fasciculus of the 4th vol. of the *Transactions of the Agri-Horticultural Society.* We have abridged it to suit our pages.—ED.]

Geology.—Approaching the Kossia mountains, I observed small insulated knolls projecting abruptly out of the low marshy plains by which they are surrounded. They are seen extending along the base of the mountains as far as the eye can reach, and proved to be the remains of a former talus, from the fact of the summits of some of them being composed of coarse pebbles and boulders.

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* DR. RICHARDSON of *Madras.*—R. B. P.

The acclivity of the Kossia mountains facing these knolls, may, without any great inaccuracy be divided into three stages. The first a rugged, but gentle slope to the height of about 1500 feet; the second precipices, and the third a succession of summits. Extending along the top of the first stage, and at the base of the second, I found the well marked remains of a raised beach, characterised by a deposite of marine shells, twenty-five species of which, I have identified with an equal number of species comprised in a small collection of fossils from the Paris Basin, presented to the Asiatic Society of Bengal by Mr. Christie. The smallness of Mr. Christie's collection, consisting only of about 150 species, prevents me at present from establishing perhaps, a much more extensive agreement between the tertiary remains of these two remote localities.

Descending at another point, ten miles to the westward of this situation, I found at about the same altitude, a continuation of the line of organic remains; but the fossils were here grouped together in distinct families, as is observed to be the case in the subappennine deposites. I have procured sufficient materials from these beds to enable me to establish their nature, as soon as I am provided with the means of comparing them with the fossils of other tertiary groups which have been examined in Europe.

Without dwelling farther at present on the geology of the Kossia mountains, I shall merely observe that their agricultural character appears to improve much after crossing the valley of the Boga-pany. Previous to that, the surface being composed of horizontal strata, is barren, and without soil except in ravines; but at Muflong, where the rocks become inclined, a fine rich soil is abundantly retained on their surface, while the ravines afford an iron sand, in more than sufficient quantity for all the purposes for which the metal is required in the neighbouring country; but the ore is not found in sufficient quantity to render it an object of that importance, which it otherwise would be, in the vicinity of such extensive repositories of coal as here occur.

Should it be thought desirable to give the tea plant a trial in the Kossia mountains, I would recommend a situation at the western extremity of the valley of Myrung, where the soil is derived from a granular foliated felspar, very similar to the rock that affords some of those tea soils, which have been collected in China.

But for the circumstances of the raised beach, as well as of the discoveries of the late Mr. Scott, at the Colibaree hills, Assam would present itself as an instance of a great valley of denudation. This would also be supposed to be the case, if the mountains on the two opposite sides possessed any characters in common. Porphyry, primitive limestone, serpentine, granite, and talcose slates, compose the mountains on the northern side of the valley, while tertiary sand-stones, shell lime-stone, and coal, compose the southern group; in conjunction with metamorphosed gneiss, green-stone, and sienite.

Here then we have two distinct systems, with the valley of Assam interposed between them. The valley contracts towards its outlet, to a breadth of only twenty miles in Lower Assam; but in Upper Assam, its breadth is probably fifty miles. In Lower Assam the breadth of the valley is still farther contracted by a small system of hills given off from the mountains on the south; through these hills, the Bramaputra flows with a pretty uniform current, at the rate of about three miles an hour.

At Gowahatti the Mekeer hills, as they are called, are composed of metamorphosed gneiss, consisting of quartz injected into felspar from below, and containing beds of mica. In other places sienite, also containing veins and masses of quartz occurs; and at Goalpara, hornblende containing concretions of felspar, constitute the rocks in the immediate vicinity of the river.

At Noagong the rocks composing a portion of the Mekeers, called Solano, are of a magnesian nature, including lenticular masses of the size of large boulders, of granular and compact quartz, and pebbles of various kinds imbedded in a fine, curved, slaty matrix, and the whole arranged so as to represent the figure of an irregular volcanic cone; near which, in the open plain, an insulated accumulation of granitic masses form a mound of twenty or thirty feet high. Whether these granitic masses were propelled from below, or projected from a volcano, I had no means of determining during my hasty visit to the spot; but they possess no common character with the other rocks in the vicinity, that I saw.

Without entering farther into particulars at present, I think it will be conceded, that Assam is not a valley of denudation, and that the mountains on either side not only belong to perfectly distinct epochs, but that Lower Assam has itself been subject to very considerable disturbances, the effect of which has been to raise the general level of this part of the surface, by which means the waters in the interior were confined for a short time, until the accumulation of silt obliterated the depression within.

Upper Assam, as may be expected from these views, is an extensive alluvial basin; regarding which, much depends on the accuracy of our general and particular observations, as it brings us at once to the main object of enquiry—the history of the tea plant and the circumstances in regard to soil under which it exists.

In considering the extent and nature of this basin, we are at once struck with the peculiarity of a perfect plain about eighty miles long, and forty broad, surrounded by lofty mountains and invaded by four enormous rivers, besides six or seven smaller ones, the least of which is as large as the greatest river in England.

These streams are so many great channels, by which nature conveys into the valley, the productions of the mountains; and it is only necessary to mention the direction from whence a few of the principal streams are derived, in order to be prepared to find, in the natural history of this romantic and singular spot, a greater variety of objects than a similar extent of any less peculiar situation could be expected to afford.

The first of these great rivers is the Dihong, which enters the valley by a narrow defile in the Abor mountains about twenty-five miles N.W. of Suddyah. Every circumstance seems combined to render the Dihong liable to sudden, or at least excessive periodical inundations, its hydrographical basin extending amidst snows, parallel to the equator from the 82° to the 98° of longitude, along the elevated plateau of the Himalaya.[*]

The first rise of this river takes place in the beginning of March, and amounts to about fifteen feet, said to be occasioned by the melting of the snow. Towards the middle of April, there is a general subsidence of about ten feet, and the river retains something more than its ordinary level, until the periodical rains set in, when the inundations commence, the river then begins to rise at Gowahatti, where it attains in July and August a height of forty feet above its level during the dry season.

The second great branch of the Bramaputra—the Dibong, enters the valley by a similar defile to that of the Dihong. Between the defiles of these two rivers, which are not above 15 miles apart, there is a remarkably abrupt and picturesque mountain, terminating in three peaks, on the highest of which snow lies for two-thirds of the year. The source of the Dibong is unknown, but it must approach, if it does not

[*] According to Malte Brun the peculiarity of the inundations of the Nile depends on its course being extended from east to west within the tropics. The inundations of such rivers are higher but less sudden than those of rivers running parallel to the meridian like the Suban-Shieree.

pass within, the mountains on the frontier of China. It forms the natural boundary between the Abor, and the Mishmee tribes.

The third branch of the Bramaputra, is that which retains the name of the great river, from its falling straight into the axis of the main trunk, from the opposite, or eastern extremity of Assam. It enters the valley by a series of cascades, it is said, rather than by a deep defile: and indeed this peculiarity is distinguished at a distance of thirty miles, by the accumulations of rolled stones which have been propelled forward, causing a succession of rapids which gradually increase in number and difficulty. This river, after its entrance into the valley, receives the Digaroo and Kondul rivers from the Mishmee mountains on the north, and the Noa Dihing and Tenga from the south-east. For reasons to be afterwards assigned, it will be well to keep the direction of the two last named rivers in view.

The fourth great branch of the Bramaputra, called Suban-Shieree, takes its origin, it is supposed, in Thibet; and enters Assam from the north, below the junction of the other great branches, and at right angles with the great fluviatile trunk. From its southerly direction, and the peculiarity of its source in the snows of an elevated chain, from which it descends transversely, the inundations of this river take possession of Assam, previous to those of the other rivers. The silt which its floods convey into the valley (where they spread and lose their impetuosity), is consequently deposited so as to impede the course of the Bramaputra. The great stream is thus caused to diverge from its direct course, and from time to time to force its way, by the bursting of new channels. Between two of these at present, an island, sixty miles long and ten broad, is formed at the confluence of the Suban-Shieree, chiefly by its silt.

It has now been shewn that Upper Assam is an alluvial basin, formed by the confluence of various great rivers, which flowing from opposite directions, meet in its centre. I have been unable to determine whether the original surface underwent any subsidence of its former levels, or whether the elevation of the rocks in Lower Assam was the only cause of the production of the basin. The total absence of any rocky protrusions through the alluvium, and the general levels relatively, between Upper and Lower Assam, as well as Bengal, being only such as to afford an ordinary current of about two miles or three an hour, indicate a depression of the older rocks in Upper Assam. More extensive observations, and experiments in boring, can alone determine this point.

The rivers as they fall into the valley, precipitate such portion of their contents as their waters from diminished velocity are unable to convey further. This has occasioned a succession of low rounded sand hills, which are particularly to be observed on the south eastern side of Assam, at the tea localities of Cuju, and Nigroo where from the rapidity with which the Noa Dihing and Bora Dihing, fall into the valley, such accumulations are most to be expected.

There is consequently a general inclination of the surface, in this direction, extending from the main fluviatile trunk, to the foot of the mountains. Along this descent, the Debru, Bora Dihing and Disung rivers flow in very indolent currents from the S. E. where they take their rise, except the first, in the Naga mountains. If we add to these rivers a small stream which rises in a southerly direction, in the same mountains near Gubru-purbut, we have an accurate definition of the limits of the tea plant in Upper Assam.

Cuju, one of the places in which we found the tea plant, is situated at the source of the Debru; Tingrai, another tea locality, is on the bank of one of its tributaries; and Noadwar, a third situation at which we found the plant, is in a tract subject to the inundations of the same river; and we heard of its existence at Cherrabie, in still closer connexion with this stream.

At the source of one of the tributaries of the Bora Dihing, we examined the tea plant near the village of Nigroo; and heard of its existence at the extreme branch of that river, in hills twenty miles south-east of Nigroo.*

We have also positive information of the existence of the plant, at Borhath, near the foot of the Naga mountains, and close to the source of the Disung; but circumstances prevented our visiting either of the three last mentioned places.

Of the different streams just noticed, whose banks afford localities of the tea plant, the Debru, if not the most interesting, is at least the one with which we are best acquainted. It rises in the sand hills, or undulating country between the Bora Dihing, and Noa Dihing rivers, and derives its first waters from springs situated between the sand and clay deposites. The stream is languid, and not such as to indicate any great difference of level throughout its course, which is about sixty miles in a N. W. direction, but its banks near its source are from twenty to thirty feet high, and the surrounding country is dry; while the very reverse obtains in the middle of its course, and from thence to its confluence with the Bramaputra.

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* The colony of plants alluded to is situated at Namroop; many of our attendants had been there and saw the plant.

During the few excursions we made into the interior, I found other transformations of the original surface of the country, referrible to artificial, rather than to natural causes: such for instance as extensive embankments, raised as fortifications in remote times, when the resources and population of the country must have been in a far different state from what they are in at present. But the remains, in Upper Assam, of such works as are here alluded to, have an interest of another description in this enquiry, distinct from what they would afford to the antiquary.

When we find those artificial embankments, or tumuli, extending for miles through the most deserted tracts of Assam, raised often to the height of 20 or 30 feet above the plain, and overgrown with ancient forest trees; as large as those amidst which the colonies of wild tea plants are found, the question is at once suggested—"May not these colonies of wild plants, have been cultivated gardens, into which the plant was introduced artificially?" A doubt would be thus cast at once upon the indigenous nature of the tea plant, and though it may have since propagated and grown spontaneously for ages, yet the chances against its successful cultivation for commercial purposes would perhaps in consequence be increased.

Farther arguments might be adduced in support of this view, by referring to the antiquities of Assam; which are both extensive and decisive as to the former existence of such a state of society in regard to refinement, as would lead us to conclude that the luxuries of neighbouring countries (and the tea plant among the rest), were probably artificially introduced.*

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* At Teespore, near Bishenath, on an eminence by the river side, the surface to the extent of an acre is covered with architraves, cornices, pilasters, columns, and all the essential parts of a splendid building, carved in granite. The ornaments present a mixture of Saracenic and Roman styles. The stones do not agree in their nature with any of the rocks in the vicinity; and from the way in which they are strewed, as well as from the freshness of their angles, would never appear to have been used. Temples of Hindoos are numerous, and about Gowahatti, some of them are very extensive and more elegant than I had previously seen in any part of India. Those that excel most in every respect are the most ancient, and are built of granite. Many of the insulated hills in Lower Assam have their masses sculptured in situ representing gigantic figures in bas-relief; and as such monuments are referred to Buddhists of early date, they prove, that the masses on which they have been marked, have undergone no general change in very recent times, although they do present some signs of the disturbing influence of earthquakes, which are said to be here frequent and severe.

On the other hand, it may be observed in favour of the indigenous nature of the plant, in Upper Assam, that it is not found beyond the bounds of the alluvial basin; so that we must ascribe to the latter, some natural influence to which we are indebted for the possession of this plant; as such restriction appears to me to be dependant only on natural causes, which do not alone affect this species, but also various others in both kingdoms of organic nature in like manner.

The plant is traced along the course of the small rivers which enter the valley from the south-east, in a series of distinct colonies; rendering it probable that the seeds have been transmitted forward along the course of the currents. It is not necessary that the seeds should have been conveyed at once down the current of any one of these streams from a great distance into the valley, or to suppose that their vegetative principle could survive submersion in a current for any length of time without injury. It is enough, that a single seed may have fallen from a Chinese caravan, near the source of one of those fluviatile ramifications which converge to the valley, on every side, over 18° long. and 4° lat., where it may have been deposited under circumstances favourable to its growth and propagation. A colony would thus be established, from which thousands of seeds might be annually transmitted, and although ten thousand of these might be lost, still one of them might be drifted during a flood along the banks of a stream; and deposited under circumstances favourable to the establishment of an advanced colony, and so on.

This view of the way in which the tea plant performed its migrations into Assam is not merely theoretical, as it occurred first from facts which were presented to me, during an examination of the tea colony at Tingrai, as will be afterwards shewn.

The next object is, to inquire whether we have any proof of the direction from whence the plant has been conveyed into the valley. It is necessary to call to mind that Assam is divided from the east to west, by the Bramaputra; and that in the northern section of the valley thus formed, no tea colonies have hitherto been found, hence the plant would not appear to have been introduced from countries in that direction; nor did Mr. GRIFFITH find any trace of it in the Mishmee mountains, or even that the Mishmee tribes have any knowledge of it whatever.* On the other hand, a Kamtee of rank, named Chi-long-fu, residing at Suddya, informed the Deputation that in all those countries to the eastward of Assam, tea is used at meals instead of water, and that during the hot season, it is the only drink of those who can afford to procure it—that it is drank at meals by people in good circumstances, and that the poor have it only at feasts, because they cannot procure it at other times. He also informed us, that it is by the common people of those countries with which he himself is connected, the general offering made to great men on visits of ceremony, when compliments are intended to be paid. It is cultivated, he says, in gardens; and plantations are reserved for the purpose of procuring it, and that the expense is equal to about one anna for two pounds weight. When preparing it for use this quantity is placed at once in a large vessel from which individuals of the party help themselves.

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* Letter to the Tea Committee.

He farther assured us, that the tea thus universally used, is identically the same as the wild plant now growing in Assam, and that it is prepared by all the nations east of Suddya, with which he is acquainted, just in the way that it is now prepared by the Singphos, whom it was then supposed we were about to visit.

He said it was cultivated in gardens and plantations for convenience, and for the purpose of keeping up a sufficient supply, rather than from an idea of improving its quality beyond that of the wild tea plant. In their plantations, he informed us, they did not interfere with the growth of the tree, farther than by depriving it of the leaves for which it is cultivated. It consequently attains such a size as to oblige those who collect the leaves to climb upon the branches.

This is the substance of the information we derived from a person of weight, and some political influence at Suddya; but whether it is of much value in the elucidation of the question of the cultivation and manufacture of the Assam tea plant, I shall not at present venture an opinion: but this information, and certain physical indications regarding the direction from whence the plant originally approached the valley, are mutually in confirmation of each other. Thus we have still an extreme eastern depôt of plants at Namroop, the source of the Bora Dihing river. From this, Nigroo may have been directly supplied; but Cuju, as it presents the largest plants, I suspect to be the oldest colony of which we have any description, in the valley; and situated at the source of the Debru river, it is certainly the parent of all those colonies which have been discovered along the banks of that stream.

Topography, Structure, and Soils of the Tea Colonies.—The village of Cuju is situated about twelve miles from the banks of the Noa Dihing river, and twenty miles south of Suddya, in the midst of an extensive forest. It may be approached either by penetrating on elephants directly through the forest from Suddya, or by boats, as far as a spot on the banks of the Noa Dihing, called Cuju gât, from which a foot-path extends through the forest to the village. About half way there is a small settlement of Singphos, consisting of a few families, scarcely numerous enough to justify the term village being applied to their habitations. In their neighbourhood is a patch of ground a little lower than the adjoining forest, appropriated to the cultivation of rice. With this exception the forest is totally uninterrupted from the river to Cuju, where the rice grounds of that village extend over a space of about fifty acres, some two or three feet below the level of the general surface.

The soil of the rice field is in places rich, but superficial, reposing on a grey sandy clay; but generally it is itself grey and clayey. The soil in the forest is however light yellow, and of more sandy consistence than that of the rice grounds, but still of a some what clayey texture. We crossed a small stream, the water of which was coloured with what proved on analysis to be oxide of iron. The bed of the stream being sand, we may expect the same process of consolidation to be going on here, as has already been observed in regard to the Noa Dihing.

The site of the village of Cuju, though surrounded by extensive forests, and scarcely elevated above the common level, is drier than any place I had previously seen in Upper Assam. The soil in the village, unlike that of the district generally, is of a rich brown colour, and affords good crops of opium.

The day after our arrival at Cuju, we set out to inspect the colony of tea plants, the first we had ever seen. We descended, soon after leaving the village, into a small depression, which had been cultivated for rice; proceeding about half a mile beyond this, we entered a thick forest, intersected by a small and nearly stagnant stream, the source of the Debru. The ground was somewhat more sandy, than that of the general surface which we had passed over. Pursuing a foot-path that had been recently formed, we came upon low sandy undulations, connected with the former windings of the stream we had just crossed. The sand in places was thrown up into mounds, the highest of which could not be more than twenty feet. After leaving these banks of sand, we had occasion to cross the stream again; we then entered upon level ground, the soil dark and firm under the feet, covered with grass and a few scattered trees. This was of short extent, as we suddenly entered the forest again and were surrounded by tea plants.

The first remarkable thing that presented itself here, was the peculiar irregularity of the surface; which in places was excavated into natural trenches, and in other situations raised into rounded accumulations at the roots, and trunks of trees, and clumps of bamboos. The excavations seemed as if they had been formed artificially, and were from two, to three, and even four feet deep, of very irregular shapes, and seldom communicating with each other. After many conjectures, I found the size of the excavations bear exact proportion to the size and height of the nearest adjoining trees, and that they never appeared immediately under the shade of large branches. The cause then appeared to be the collection of rain on the foliage of lofty trees; from which the water so collected is precipitated in heavy volumes on the loose and light soil, excavating it in the manner described.

The trenches are from one yard to ten in length, and generally a yard, or two yards wide; and their general figures correspond to the form of the interstices between the branches above. The tea plants are most numerous along the margins of these natural excavations, as well on the accumulations of dry soil raised around the roots of bamboos. The soil is perfectly loose, and sinks under the feet with a certain degree of elasticity derived from dense meshes of succulent fibres, prolonged in every direction from various roots. Its colour is light grey, perfectly dry and dusty, although the surrounding country was still wet, from the effects of rain that had fallen for several days immediately prior to our visit.

Even the trenches were dry, and from their not communicating with each other, it seemed quite evident, that the soil and substratum must be highly porous, and different in this respect from the structure of the surrounding surface of the country.

Extending examinations farther, I found the peculiar character of the soil in regard to colour, consisteney, and inequality of surface disappear, with the tea plant itself, beyond the extent of a circular space of about 300 yards in diameter.

It was also to be remarked here as well as in other situations in which the tea plant was afterwards examined, that insulated individuals were smaller in size, the farther they were found detached from the natural limits of the colony; which last were always found to be marked by certain changes in the soil, except perhaps in a single instance.*

We now continued our journey along a path extending through the forest in the direction of W.S.W., occasionally approaching the banks of the Debru river. The soil in the forest, is similar to that already mentioned. Animals are very few, and consist chiefly of wild elephants; the forest indeed is too damp and shaded to afford a suitable shelter to the animals of Lower Assam, and of the plains of India; and the elephant is perhaps the only creature among the larger animals, who could procure sustenance in such a place. A new species of squirrel (larger than *Sciurus maximus*), which I have named *S. bengmericus*, seems to be peculiar to this tract. Towards the close of the first day's journey, we crossed a small clear stream running into the Debru on our right; and indicating an elevation of the surface towards the east.

We spent the night in a Singpho village called Cujudoo, and the following day we continued our journey through the forest in a southerly direction. Our path for perhaps five miles, extended along a massive embankment, probably thirty feet high, and overgrown with some of the most ancient trees in the forest. From this we pursued an easterly direction, and after descending from the tumulus, found a tree fern, which I believe proved to be of the same species as that which had been previously found at Cherra-punji. The surface soon became more elevated, and undulating; but still composed of yellow sandy clay. The streams then descended in an opposite, or N. E. direction, running we were told into a river called the Maun; while those we crossed in the early part of the day, run S. W. into the Debru, proving that we had crossed a tract of forest, elevated herhaps about 50 feet above the general plain, with a gradual, or almost imperceptible ascent, and descent, on each side, indicated only by the direction of the rivulets. We then crossed the bed of a small stream of clear water, passing over pipe clay; from thence the white, or yellow sandy clay, over which we had passed ever since we entered the forests, disappeared as well as all undulations; the surface assuming the ordinary character of flatness, to which we had been accustomed, and was chiefly composed of clayey soil, sometimes blue and in places yellow, but without sandy admixture. These appearances continued for a few miles, until we entered the village of Nigroo, on the banks of the Bora Dihing river. From thence we entered the bed of a small river which joins the Bora Dihing, called at this place the Maun-moo,* and proceeding up its bed, for the distance of about three miles, reached the second tea colony.

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* I here allude to the western boundary of the upper colony of plants at Tingrai.

NIGROO.—The soils in which the plant is here found, are of three sorts, each of which differ from that in which it was found to grow at Cuju, but presenting points still more instructive and interesting than the latter colony afforded. The topography of the place, presents to our notice; First, the dry sandy bed of an occasional pond that empties itself by means of a deep drain (said to have been formed by nature, though it looks artificial), extending across the colony of plants, and communicating with the bed of the Maun-moo. Secondly, a mound of tolerably rich, but very light soil, extending in a north easterly direction, and presenting a serpentine declivity to the S. E.

The Maun-moo river partly encircles the spot, giving it the shape of a small peninsula. The level of the river is about 15 feet lower than the surface at the foot of the hillock, or mound, so that during floods the tea plants in the latter situation, must be liable occasionally, (I should think), to slight inundation.

Approaching the spot, from the river, we crossed a zone of almost pure sand, overgrown with reeds, and in the course of a few paces, reached a sandy clayey soil in which we found a few small tea plants; a few steps farther introduced us to a drier, and less consistent soil, in which the plants were found larger, and more numerous. Surrounded by tea plants, we ascended the mound, the soil of whichis light, fine, and of yellow colour, having no sandy character. Here the plants were found still more numerous than in the lower ground.

NOADWAR.—The third tea colony we visited, is near the village of Noadwar, in the centre of Upper Assam, and not above twenty-five, or thirty miles from the Bramaputra.

Proceeding to the spot where the plants are found, we passed over rice grounds which were almost quite under water from the torrents of rain then falling, in the middle of February. Having entered the skirts of a forest which, though not under water, was wet and slippery, and in some places deeply covered with mud; we suddenly ascended from the dry bed of an occasional water course,* and at first sight discovered a total change of soil and vegetation.

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* *Moo*, or *Mokh*, mouth; synonymous with *Moon*, in Bengalee.

From floundering in mud, we now stood on a light, red, dry, and dusty soil, notwithstanding the rain to which it was exposed, in common with every part of the country at the time.

This colony is probably about fifty yards in length and twenty in breadth, and extends along the S. W. brow of the dry channel: the height of the bank on which the tea grows is about five feet. The surrounding low ground is overgrown with reeds, and the higher tracts with forest trees. The surface on which the tea plants are growing is much indented, and excavated; for being loose, it is easily encroached upon, by accumulations of water when they take place in the channels. Thus situated on a loose and defenceless bank at the verge of a forest, this colony of tea plants may be considered as undergoing gradual obliteration from destruction of the surface, and there is reason to suppose that it has at one time been much more extensive than it is at present.

GUBRU-PURBUT.—The fourth colony of tea plants we visited, is three days' journey E.S.E. of Joorhath, where the plant is found in a bright yellow, or red soil, on the lower extremity of a small range of gradually declining hills, extended about three miles from the Naga Mountains into the valley. The extent of ground which is covered by this group of plants, is about 60 yards in diameter, and of circular shape. The spot is raised about fifty feet above the plain, which is low, marshy, and covered with reeds on the northern and eastern side; but the low ground on the S.W., where a small valley is formed between the hill and the mountains, is cultivated with rice, and contains several villages; but at the immediate foot of the eminence on which the tea plants are situated, the ground is too low and subject to inundation, to admit of any sort of cultivation, so that this locality of the plant may be said to be surrounded by inundated grounds on all sides except on the S. E., where the narrow chain of hills covered with forest, connects it with the Naga mountains.

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* Water courses, or what are called Beels, are common features in this part of the country, and are formed by the inundations of the Bramaputra, which, retiring rapidly, have excavated shallow channels in the alluvium to the depth of three or four feet, where the superficial yellow clay interrupts their farther progress. When not too low, they form good rice grounds and pasture.

TINGRAI.—Tingrai is the fourth colony of tea plants we visited in Assam (though I have here placed it fifth and last).

The boundary of this colony, like that of the lower one, is abrupt and defined at that portion which is presented to the direction of the current; while the lower extremity presents a lingering train of straggling individuals extended along the direction of the stream, thus proving the migration of the plant in the course of the currents, from the upper to the lower colony.

Suspecting from these interesting facts, that both colonies were supplied from some more permanent and extensive location of tea plants, I pursued the extreme channel in the direction of its source; and in doing so, found that several smaller channels entered it from the S. E., indicating a gentle ascent of the surface in this direction, from whence probably the tea seeds were directed forward from some original depôt, to the places just examined.* Having proceeded about a mile into the interior of the forest, I found my attendants who were boatmen, and not much accustomed to expose themselves, where the foot prints of tigers were so numerous, had thought it most prudent to return, and on finding myself alone, I followed their example without accomplishing the object in view.

Chemical Examination of the Assam Tea Soils.—Soil from the roots of the tea plant at Cuju. Colour light grey, uniformly fine dusty sand, without consistency. Rubbed between the fingers it feels rough, is without smell; surface broken, undulating, excavated, dry and loose, uncovered with grasses, and apparently arid.

Constituent parts in 200.	
Water,	37
Fresh fibres,	1
Vegetable matter,	5½
Silex,	135
Alumina,	11
Oxide of iron,	4¾
	194¼

Soil of the neighbourhood, taken about 500 yards beyond the boundary at which the tea plants disappear. Colour, greyish black;

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* The discovery of an additional colony of tea plants in this vicinity since it was visited by the deputation rather strengthens this view.

surface, covered with grasses, moist, uniform, firm and solid. When rubbed between the fingers this soil possesses considerable coherency and softness.

Constituent parts in 200.

Water,	52
Extractive matter,	5
Vegetable matter,	8½
Silex,	114
Alumina,	9½
Oxide of iron,	4
	193

From the foregoing enquiries it appears that the tea plant of Assam grows spontaneously under slightly distinct circumstances as follows:

1. In the level plain.
2. On embankments or mounds somewhat raised above the plain.

Cuju, Noadwar and Tingrai are examples of the first, Nigroo and Gubru-purbut are examples of the second.

The first class of situations, are distinguished from the general plain by a porous structure, and the peculiar character of maintaining a dry surface under exposure to excessive moisture; the second by a structure less porous than the first. In both, the plants are situated at the verge of inundations which prevail during the greater portion of the year on the adjoining lands.

The important peculiarity of these sites is, that they are less secure from inundation by their elevation than by their structure. Indeed the lower sites are scarcely raised more than a yard above the adjoining flat plains, which are exposed to inundations not merely during falls of rain, but also from the overflowings of the great rivers. But these circumstances, which are sources of fertility to the adjoining lands, appear to produce an opposite effect on the sites of the tea plant, thus causing the peculiar condition on which the presence of the plant in some measure depends. All soluble and subtile matters are prevented from accumulating in the soil of those sites, and are washed as it were from a filter into a loose sandy bottom—all vegetable and animal decompositions, and all chemical operations except the oxidation of particles of iron, are here prevented from taking place. Hence the characteristic colour of the generality of these soils already pointed out. Protected in Assam under the shade of dense forests and a gloomy and excessively humid atmosphere (the latter the most indispensable of all conditions as I shall presently show), the tea plant flourishes in its barren soil along the verge of rivers, lakes, and marshy lands.

Where the requisite porosity of structure is not afforded by subsoils, the defect may be overcome on the rounded summits of embankments, and on the declivities of small hills and undulations, such as those on which the plant appears to be cultivated in China:* and where these last are wanting artificial drains and trenches may be resorted to, either with the view of qualifying an unfavourable soil for the reception of the plant in the first instance, or for supplying the want of suitable porosity.

In the more sandy rice districts, the small ridges which subdivide the fields may be increased in size, and each planted with a single row of tea plants, a practice which would seem to be followed in China although the erroneous notions hitherto entertained regarding the supposed mountain habit of the plant, prevented the example from having been before recommended.

There are however many spots of suitable structure in Upper Assam, that might be selected for new plantations; the most desirable might be at once chosen, while the old colonies should be carefully preserved for the supply of nurseries. This would seem to be the more necessary, as in case of the seed becoming exhausted by the injudicious treatment of the plants composing the original colonies, the difficulty that might arise in procuring a fresh stock from China might prove fatal to Assam as a tea province. From those tea seeds which were procured from China at an enormous expense to Government, few plants have been reared, and probably not one of those few will ever bear seed. The importance therefore of abstaining from officious interference with the original colonies must be evident. None of them are very great in extent, and it is possible to conceive that as they are all in retired forests some attempts may be directed to the transplantation of the trees in a more convenient but less appropriate situation (as is almost sure to happen on such occasions if *convenience* be at all allowed to enter into our views), and thus exhaust, if not totally destroy the means of conducting more judicious experiments.

Little is to be expected from any attempts that can at present be made to manufacture tea from the uncultivated plant: but still as there is a small establishment on the spot for the purpose, consisting partly of Chinese, they might be employed in constant trials upon the leaves afforded by the different colonies in order to detect what the nature and degree of difference may be, between the products of the different soils as well as of leaves of different size. The mode of manipulation adopted with regard to each specimen, and how diversified, should be carefully noted, and reports upon the subject forwarded to Calcutta by the person in charge; together with specimens of the prepared tea packed in leaden boxes containing those aromatics upon which some of the finer qualities of teas may depend.

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* I shall have occasion to refer to authorities on this subject when considering the climate of the tea provinces.

Climate.—The wind in Assam is N. E. at all seasons, and the whole valley lies in the direction of its current. Descending from the Himalaya the air derives an impetus from its low temperature, and consequent greater specific gravity than the heated westerly wind. It is not meant that the air in the upper atmosphere in contact with the snow is heavier than the lower strata in the valley, which would be contrary to certain well known laws; but merely that the air in the vicinity of the mountains above the line of congelation, is rendered specifically heavier than the general air of the same altitude, in consequence of the heat absorbed from it by the snow. It consequently sinks, causing a motion in the warmer air to occupy its place. Thus an upper current is formed while the lower one descends into the valley where its diminished temperature renders it sufficient to overcome the heated land winds which enter from the west, by the great defile of the Bramaputra.

During those months when the westerly winds have greatest power, and the influence of opposing currents from the N. E. extremity of the valley most diminished, in consequence of the disappearance of a larger proportion of snow in that direction; the westerly winds then extend with lessening temperature and velocity as high as Bishenath in Middle Assam, beyond which they are seldom known to reach; nor is their power even there sufficient to overcome the influence of the N. E. current, more than for a few days at a time during the hottest days of April and May.

Throughout the cold season, dense vapours arise from the Bramaputra about day-light, and continue to increase until 8 A. M. when they begin slowly to ascend. They are then drifted before the N. E. wind, which from the diminished heat of the valley now amounts only to a gentle movement, the direction of which is modified by the action of the sun's rays on the upper stratum of mist, causing a more or less powerful dissipation, and exciting a movement in the general mass towards the side on which this action is taking place. The whole of the vapours are thus attracted towards the south, where unless entirely dispersed by noon, their broken masses linger on the northern face of the Naga mountains, receiving daily fresh accumulations, until they are precipitated in heavy rain, seldom however before they have served as an impenetrable canopy to this side of the valley for several weeks.

This tendency of the mists to occupy the south side of the valley, is an interesting point if considered with reference to what I have already stated regarding the absence of the tea plant on the northern side.

The plains on the northern side of the Bramaputra, may indeed be considered generally to enjoy two hours more sunshine daily, during the cold season than those on the south, a circumstance which is of itself calculated to influence vegetation, and cause a difference in this respect between the two sides of the valley.

With regard to the cause of these mists, it would be easy to say that they arise from the moisture of the forests; but if this were all, they should appear after sun-set when the heat of the day is first withdrawn; the loss of temperature would then cause a condensation in the lower atmosphere, which is not the case in Assam; nor do the mists first make their appearance in the forests, but on the river, and on such parts of it as are shallowest and most languid in current.

I attended as closely as I could without neglecting other equally important matters, to these peculiar phenomena, and the only conclusion I could come to from the observation of simple facts was, that they arose from the difference of temperature between the water of the Bramaputra and the air, which amounted to a mean difference of 15° Fahr. during the month of December. Throughout that month, in our progress up the river from Gowahatti to Suddya, I found the water at sun-rise vary from 55° to 56° Fahr. and the temperature of the air at the same time, from 38° to 42° Fahr. This difference causes the water to give off more vapour than the air can hold suspended in an invisible form; partial condensation immediately ensues, and the sensible vapour is then seen curling over every portion of the river, just as steam presents itself to view ascending from the surface of heated water.

Those high altitudes by which Assam is surrounded, occasion a rapid abstraction of heat during the nights of the cold season, in which the waters and the air participate unequally, as conductors of different powers. The latter consequently retains a higher mean temperature than the former, and assists during the cold season to check excessive diurnal variations. On the other hand, in the hot season, when the radiation of heat from extensive wastes of sand is prevented by the freshes which cover them, and the volume of water increased, as well as the rapidity of the rivers by the melting of the snow; the rivers then present a temperature much beneath that of the atmosphere whose heat they now contribute to lessen, just as they promoted an opposite effect during the cold season. Nor is this influence of large bodies of water upon climate confined to Assam; it applies equally to all great valleys similarly situated, and especially to those inland provinces of China whose productions are so similar.

From what I could learn regarding the temperature of the hot season, it would appear that 82° Fahr. at Suddya, is considered as excessive as 96° in Calcutta; and although the quantity of rain that falls during the year may be supposed from a combination of circumstances, to be much in excess of what falls in Bengal, yet there is reason to suppose that during the months of July, August, and September, the quantity in Assam may be no greater than elsewhere; the absence of any season of perfect drought being the peculiar feature of the climate. If however the theory by which I have endeavoured to account for the peculiarity of wind, during the S. W. monsoon be correct, it is difficult to conceive that clouds and showers should not be frequent, or at least occasional during the months of April and May.*

From these general observations on the climate of Assam, we may venture to infer that in regard to heat and moisture, it possesses many peculiarities when compared with the open plains of Bengal.

Looking down from the Kossia mountains into the valley, in November, it presented the appearance of one vast lake, from the sheet of vapour under which it was concealed for several hours daily.† While ascending the Bramaputra in December, the weather was generally dark and gloomy with some rain. During the time we were in the forests, which embraced the greater portion of January, we seldom saw the sun; and the early part of the month was chiefly wet. February, and until the middle of March, was generally wet; nor have I often witnessed even during the regular rainy season, heavier or much more frequent falls of rain than took place in Assam at this period. On the most moderate computation, I do not think we could reckon the quantity of rain that fell during the three months above mentioned, at less than 15 inches; yet during the same period in Calcutta, I find on reference to Prinsep's Journal, that only 2 inches of rain fell—one shower only having taken place in December, January being dry throughout, and February affording but two days on which any rain whatever fell.

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* On two winds of different temperatures and differently saturated coming into contact, the result would be the formation of a cloud or the precipitation of rain according to the proportion of moisture contained in the warmer vapour. See PROUT's *Bridgewater Treatise*, 298.

† This was sometimes observed even for several days, and may be considered to have been actually the case during the greater part of the two following months, but being then in the valley we could not perceive it otherwise than by the shade. The effects of these clouds upon vegetation, and in checking extremes of temperature, may be conceived from the circumstance that when they were first observed from the Kossia mountains, a keen N. E. wind blew daily, and from which the valley was quite protected by the vapour.

I have already hinted at the importance of Zoology as calculated to assist in casting a light upon the peculiarity of climates, and as affording data for the comparison of one with another. If we consider how instrumental birds for instance are, in the dissemination of plants, how essential certain seeds and certain flowers are to the support of certain animals and insects, we perceive at once rational grounds for expecting to be able to trace an accordance between the vegetable productions of our country, compared with those of another, when the Zoology of both agree in particular features; and hence the application of these principles to the present object.

The preponderance of Malayan over the northern forms in Assam, notwithstanding the lofty range of mountains which might be supposed to contribute to an opposite effect, and rather attract animals towards the south is an interesting indication which will be at least corrected, if not confirmed by my collections. But though lofty ranges of mountains afford climates equal to certain proportions of higher latitudes, yet animals in order to enjoy such insulated positions would be confined to ridges only, without being able to indulge their natural wandering propensities except under exposure to the heat of valleys. On the other hand, animals of the south may extend considerably beyond the strict limits of their geographical sphere, by taking advantage of the shelter of mountain chains, and thus experience no very remarkable change of circumstances from what nature intended they should bear; and in this way we may account for many of the peculiarities of the natural history of Assam, which are not confined to the tea plant, but extended to other species perhaps equally restricted in their habitat. In the animal kingdom the interesting genus Ciconia of Cuvier presents two distinct species of crane as large as the adjutant (ciconia dubius) and which are quite unknown in Bengal or any other part of India. I have already adverted to a large squirrel as peculiar to Eastern Assam, and although it is there extremely common, not an individual has been found in Lower Assam; or even beyond the northern limit of the alluvium. From thence it is probably extended to the eastward, but occurring only in valleys affording similar vegetation, and consequently possessed of similar peculiarities in structure and climate to Assam. The Simia Hylobates agilis Duvaucel a species of ape, appears from the observations of Dr. HARLAN to be almost equally limited to Assam and its vicinity.*

If from the lower animals we now direct our attention to the various tribes of man which compose the several nations by which Assam is surrounded, we shall find the same line of demarcation interposed between the eastern and western varieties of this species, as already observed with reference to other beings. The Singphos, or people who inhabit the Dupha mountains display in the construction of their face, the light colour of their skin, their manners and ingenuity, the almost pure Mongolian or Chinese race. The Nagas on the contrary, who inhabit the vast mountainous country extending from Assam to the frontier of Birma, incline (if I may judge from the few individuals I had an opportunity of witnessing), to the most degenerate of Caucasian Hindoos, but without a trace of their religion. Yet it is a curious fact that the Kossia tribe which occupies the western extremity of the same mountain-group, are a well marked branch of the Mongolian race, which here appears to have extended to the extreme point where the climate and natural productions cease to resemble those of the countries from whence they were derived; and thus surrounded by powerful Caucasian nations, and intercepted by the Nagas, this insulated people appear not merely to have maintained their independence; but the purity of their blood, as well as distinct customs, language, and religion.

In this way we derive from Zoology additional aid in support of those views which the sister sciences afford, and are taught to look upon the tea plant in Assam, thus associated with the natural productions of Eastern Asia, not as an alien estranged from its own climate, but as an indigenous plant neglected it is true by man, but in the full enjoyment from nature of all those peculiar conditions on which its properties will be found under proper management to depend.

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* It is described in his Medical and Physical Researches, Philadelphia, 1835, page 18, as a new species under the name of Simia hoolock.

5.—*Notes on the Agriculture and Rural Economy of the Valley of Nepaul.—By* A. Campbell, *Esq. Officiating Assistant to the Resident.*

[Dr. Campbell has obligingly favored us with a copy of his excellent treatise, under the above title, which forms the 2d fasciculus of the 4th vol. of the *Trans. of the A. and H. Society,* of which we avail ourselves to introduce the general descriptive portion in this Journal. —Ed.]

The entire surface of the valley of Nepaul is either under regular cultivation, or capable of being so. It is completely free from rocky and stony tracts, as well as sandy wastes; and, with very few exceptions, the fields have a superficial stratum of nutritious soil, a foot or more in thickness. The area of the valley, in the absence of a professional survey, cannot be correctly stated; nor is it easy to make a near approximation to it, on account of the irregular outline formed by the basis of the boundary mountains, which throw spurs inwards in some places more than a mile in length, forming bays or subordinate valleys of considerable extent. The average extreme length from east to west, including the retiring valleys, may be estimated at 20 miles, with an equal breadth, similarly calculated. The valley proper, or such an area as might be squared by drawing a line along the inner extremities of the mountain spurs, has a diameter in either direction of about 15 miles. Within this space however, is included the low ridge of hills which being given off at Dochoke, the western mountain boundary of the valley, runs eastward and by south, crossing the channel of the Bagmutti river, until it terminates in the general level near the village of Sussanally, situated at the south-east corner of the valley. The above limits give as a maximum average of arable surface 400 square miles, or 3,56,000 English acres, and as a minimum average, 222 square miles, or 1,42,000 acres. The former, on account of the hilly portions which intervene in the subordinate valleys, and are but partially cultivated, is considerably I believe beyond the mark, while the latter estimate, from excluding altogether the retiring valleys, is to that extent deficient, as the surface of these subordinate valleys, is of greater extent than the uncultivated proportion of the mountainous spurs which form them. We may I think safely assume as a mean, and correct diameter to the arable land, 18 miles in each direction, which gives an area of 324 square miles, or 2,07,360 English acres asunder, or fit for agricultural operation, and for yielding the higher descriptions of produce. There are precipitous portions of the mountainous faces bounding the valley, particularly on the south and west, where Indian corn and Murwa are occasionally cultivated; but the angle of these is so acute and the soil so unproductive as to render the husbandry of the rudest possible description and their produce too scanty to entitle them to be included in the regularly cultivated valley land. To speak generally, the mountain bases bounding the valley, too steep to admit of being cut into terraces, are excluded from the area above laid down; and with sufficient reason, as, in such lands, water cannot be retained for the growth of rice, and the quality of the soil is such as not to admit of the sowing of wheat, or any of the numerous and nutritious pulses, which abound in the more level lands. The crops of such places are limited to Indian corn, Murwa, and Phofur.

The general appearance of the valley, viewed from the summit of any of the surrounding mountains, is that of a series of hills with intervening valleys, irrigated plentifully by miniature canals, and traversed in a waving line from north-east to south-west by a moderately sized river, in which many of the streamlets directly terminate, and in the direction of which all are bending their course. This appearance is not so striking in the drier months of the year, although sufficiently evident even then, as during the rainy season, when the Bagmutti river by which the entire waters of the valley quit its boundaries, may be most aptly likened to a large venous trunk of an animal body, formed by innumerable smaller branches, each collecting at their source the fluid which animates as it runs, the bodies which surround it. From the cloud capped mountain peaks these little feeders take their rise, increasing as they rush down the precipitous sides, until, arrived at the more level base, they grow calmer and less fretful, permitting themselves to be diverted by innumerable channels into the fields below, and their speed to be wasted by diffusion over the terraced flats prepared for their welcome reception. Others of these feeders issue in considerable volume, and at once, from the foot of the hills; forming abundant and permanent springs of the clearest water. This occurs especially at the foot of Nagarjun, a high round-shaped hill forming the western boundary of the valley, covered by a thick stratum of soil from base to summit, and having in the neighbourhood of the spring no water course for the torrents along its face. At Nilkanth on the northern, and at Godawrey on the southern boundary, there are similar springs which continue to pour forth a steady stream throughout the year. Each of the springs is the favourite resting places of the respective presiding deities, whose images alone are now extant; but according to popular belief these holy emblems are of divine origin, not having been made by human hands.

Viewing the valley from its centre, and contrasting its surface with the masses of mountain which surround it, it has the appearance of a plain gradually rising on all sides to the bases of the mountains, but a more careful examination points out a division of its surface into two separate elevations. These I shall call the *higher* and *lower levels* of the valley when describing the agricultural occupations of different seasons, as the general system and routine of husbandry varies on each. In the above division of the valley's surface, the hill sides under rough cultivation are not included. The lower level through which the two principal rivers (Bishomutti and Bagmutti) and their feeders run, is for the most part, nearly flat, having a very gradual descent from either side of the valley towards the main streams. Its soil is less clayey in general than that of the upper level, and from the greater facility of irrigation and certainty of flooding during the rains, its crops of rice are more productive, and its value for purchase and rent higher. The upper level, has for the most part, an elevation of from 30 to 80 feet above the lower. In some places the one gradually runs into the other, the transition being unaccompanied by any sudden or defined line, terraces of cultivation extending from the top of the upper level, down to the river edges. In other places the one is defined by perpendicular descents of 50 or more feet, along the basis of which the rivers sometimes have their course, while in a third place these precipitous banks point out the different levels far removed from the streams. The extreme height of the upper level is no where more than 100 feet above the lower; for the hill of Simbhunath although, at first sight belonging to this division, is really a spur from the neighbouring hill of Ek Changu. The hill near the temple of Pusputnath is elevated more than 100 feet above the Bagmutti, as this stream winds its course round three sides of it; but this hill may also with propriety be excluded from the valley levels and looked upon as a portion of a low range of hills stretching from north to south, and crossing the course of the Bagmutti. The Gankurun hill, which is a spur from Sheopooree, forms the northerly extremity of this partially defined range; on the south it vanishes gradually into the ordinary higher level of the valley lands.

To recapitulate summarily, we have in the valley of Nepaul, an area of 325 square miles of arable land, forming a basin of uneven surface surrounded by a circular chain of mountains, varying in height from 500 to 2,000 feet above the plain, watered by innumerable streams, and blessed with a healthy climate and a fruitful soil. The capital of Nepaul is placed by Buchanan in north latitude 27° 42', and east longitude 85° 36', the mean elevation of the valley is reckoned at 4,782 feet above the plains of Bengal, and the heights of its surrounding mountains by barometrical measurement are as follows.[*] Mahadeo Poker, or the highest peak of the eastern boundary, 6,786 feet; Jaber Powah, the north-east boundary, 5,716; Sheopooree, or the highest peak of the northern boundary, not known; Colonel Powah, on the nort-west corner, 6,654; Chandragiree, or the southern boundary, 6,600; and Phoolchoke, bounding the south-east corner, 6,800. These circumstances exercise such a powerful influence over the produce of the soil, as regulators of climate, that they will not, I presume, be deemed out of place as prefatory observations. The mean annual temperature of the valley is 64 . The population of this area was estimated by Mr. Hodgson, in 1832, at no less than 2,90,000 souls, which allowing 400 square miles as its inhabited extent, gives the extraordinarily large number of 725 to the square mile: a proportion so far as I am aware, not known to exist in any country of the world, and one which I believe Mr. Hodgson is willing to allow to have been rather exaggerated even for the valley of Nepaul. It is however certain that this valley teems with human beings, its whole surface being sprinkled with towns, villages, and insulated dwellings. No portion of India with which I am acquainted can be compared to the valley of Nepaul in density of population, and it is not improbable that after the most correct estimate shall have been obtained, it will shew a population, compared with its area, equal in extent to that of any country in civilized Europe. Allowing the utmost possible extent of area to the valley within its mountainous boundaries, we could not assume more than 30 miles in length, and as much in breadth,[†] as its dimensions, or 900 square miles; and at this exaggerated rate, we should still have, by Mr. Hodgson's estimate, a population of 322 and a fraction to the square mile. In East Flanders, as containing the maximum rate of all Europe, a recent census gives 560 souls to the square mile. In the most populous parts of Ireland the greatest proportion to the square mile is 345 souls. In Berkshire in 1831 it was only 193 to the square mile. In Bengal it is estimated at 203 to the square mile,[*] and in the cultivated portion of Orissa it did not exceed, when Mr. STIRLING's report was compiled, 135 to the square mile. The population, whatever be its real amount, is almost entirely agricultural, as, with the exception of the soldiery stationed at Cathmandu, amounting to 6 or 7,000 men; and the chiefs and higher officers of Government every inhabitant is more or less directly engaged in the culture of the soil. The artizans, religious orders, and persons employed in the government offices do not, it is true, actually labour in the field, but being almost universally the representatives of the Irish middlemen, and Scottish tacksmen, they come correctly under the denomination of Agriculturists. The poorer artizans, such as carpenters and bricklayers, divide their time between the practice of their trades and the culture of their little fields, while the better class of tradesmen, although enabled to confine the work of their own hands to their crafts, are invariably holders of land, sometimes cultivating it by means of hired labourers, but most commonly by the system of subletting to the Japoos, or the strictly speaking agricultural class of the Newars. The arrangement usually made by these land holders is for the receipt of one half the produce, the actual cultivator retaining the other, as his wages of his labour.

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[*] Captain Robinson is the author of the observations which give these measurements.

[†] These are the limits assumed by me taking in the sub-valleys around the big one.—B. H. H.

Formation of the valley soil.—The soil of the valley, although considerably diversified, is in the mass composed of alluvial deposite, there being no traces on the general surface either of the primary or secondary rocky formations; indeed, throughout the entire extent of both levels, there is not a stone of any magnitude, and scarce a pebble to be found. The only rocks accessible within the valley, are those composing the diminutive ranges described as spurs from the surrounding mountains, and trans-secting the basin. These are of several kinds, some of them, as in the more easterly portion of the range which tends from the west towards Sussanally on the east, contain a considerable quantity of carbonate of lime, but so intimately blended with a clayey slate stone, as not to admit of being converted into quick lime by burning, although it will frequently effervesce on the application of muriatic acid.

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[*] Mr. BAYLEY estimated the population of Burdwan in 1814 at 600 to the square mile, but this district is incomparably the most populous one in Bengal, as Lancashire is of England. In the county the population is estimated as high as 800 to the square mile, a difference from that of Berkshire greater than between Burdwan and Bengal generally.

To the west of the Sumbhunath hill again where there is a stone quarry, the rock is either of grey granite, or of a crumbling sort of sand-stone tinged with a reddish yellow colour. The Gankarun hill is composed, at its northern extremity, of hard granite with a superficial stratum of clayey slate, which is under constant decay, leaving a reddish clay soil along the sides. The granitic portion is exposed to the extent of 20 or 30 yards in the bed of the Bagmutti as it passes through a cleft on the northern extremity of the hill, the stratum forming an obtuse angle (say of 20 degrees) with the horizon. Of whatever variety, the superficial soil must, I think, be regarded as a debris formed during ages of decay from the surrounding mountains; for although the composition of the soils occupying the central parts of the basin may not be easily traceable at the present day to their mountain progeners, the similarity in many places of the soil along the mountain bases, and stretching for many hundred yards beyond them into the valley to the earthy or rocky formation of the hills immediately over them is distinctly manifest. An example or two of this may be recorded; the southern aspect of the Sheopooree boundary, is formed, to an elevation of about 800 or 1,000 feet from the mountain's base, of a white micaceous sand-stone, and we find the superficial stratum of soil which extends into the valley, on the higher level, for about a mile, of a very light sandy nature, largely mixed with mica. The superficial stratum of the valley face of the Nagarjun mountain is principally composed of a stiff and hard red clay, to which we find corresponding in the whole of the cultivated land lying along its base from the Sumbhunath hill to Ballajee, a distance of three miles, a great predominance of this substance.

The process of addition to the valley land from the mountain debris is in some places at this time in such active operation, as to be distinctly observable in annual additions to the cultivated spots extending up the declivities of the mountains. On the valley aspect of Chandragiree which forms the south west boundary, this process is very obvious. The valley by traditional lore is described as having been an immense lake, the Sumbhunath and Pusputnath hills forming lands on which the gods found resting places and appropriate sites on which to be worshipped. The drawing off the waters is of course ascribed to the direct agency of some of the local deities, and "*the Sabre* cut," though the southern boundary of the valley forming the only outlet for the present waters, and the one by which the lake was emptied, is still pointed out as the handy work of a renowned demi-god (Manja Ghosa by name). An earthquake, with which the people of the Himalayas are sufficiently familiar now-a-days, as they doubtless were in remoter times, is an agency they will not accept of as more likely to have burst asunder the rocky barriers of the lake and given exit to its waters. HUMBOLDT or JACQUEMONT could probably have solved this interesting question. It is remarkable that in no part of the valley are fossil shells of aquatic races to be found, a circumstance sufficiently curious when taken in combination with the opinion of the former state of the country. Dr. BUCHANAN seems to have assented to the popular notion on the subject, without offering an explanation of his views. It is however certain, that if the narrow passage through which the river now flows did not at any previous time exist, the tract above it, which includes the whole valley, must have been a large lake, formed by the pent up waters of the surrounding hills, which now form the Bishomutti and Bagmutti river, with the innumerable tributary streams. Not a drop of water finds exit from the valley, save by this one narrow outlet, which pours its torrents in a southerly direction through the Mahabharat and lower ranges of hills, into the plains joining the Ganges near Monghyr. The waters from the outer side of the northern, eastern, and western mountainous boundary of the valley, run east and west, the ormer falling into the Koosi, the latter into the Tirsoolgunga of the hills or Gunduck of the plains. The Koosis (for there are several streams bearing this name within the hills east of Cathmandu), unite their waters in the plains, and fall into the Ganges opposite Bhaugulpoor. The Tirsoolgunga reaching the plains at Tirbeni, flows through Sarun to the Ganges, joining the latter river at Hajeepoor.

Winds, Rain, Pressure of the Atmosphere and Temperature.— Not being at present prepared to give a specific account of the climate of the valley from personal meteorological observations, it will be sufficient to indicate generally its character as it has reference to the productions of the soil.

The most marked characteristics of the valley climate, are its extreme humidity and the irregularity of the winds, as to direction and intensity. The former of these circumstances, arises from the retention of so much water as is required for raising rice crops, together with an annual average fall of 50 inches of rain water; and the latter, from the high mountainous boundary girding the valley, by which the currents of air passing over their summits are prevented from reaching the valley's surface, It is often difficult to ascertain correctly from what direction the wind blows, so calm is the atmosphere, or so irregularly do blasts from the mountains rush down into the subjacent plain. This calmness and irregularity in direction of the winds is most marked during the rains, and early part of the cold season, or from the middle of June to the end of January. From the beginning of February to the commencement of the rains, the wind blows during the day pretty steadily from the west, veering round to the north-west at evening during the months of February, March, and April, and to the south-west at the same time of the day during the month of May and early part of June. From the commencement of the rains until their termination, the wind blows *generally* from the south, and south-west; *occasionally* from the east, and south-east, and very rarely indeed from the west or north-west. After the cessation of the rains, which is generally simultaneous with that season in Behar, the winds are more various, blowing occasionally from all quarters, but *most rarely* from the west, and *most frequently* from the north. A register of the direction of the wind kept at any one part of the valley would but ill suffice to ascertain accurately the course of the wind for the day throughout the valley generally. It is almost always observable at the confines of the valley that the wind blows from the mountains at evening, and although I cannot state the fact from observations made at the same hour in different parts of the valley confines, I have, when in these situations, so invariably observed the wind to blow from the nearest mountain, that I believe at evening during the dry and hot season especially, the wind blows from all points of the horizon into the valley at the mountain bases; after which the currents of air are joined with the wind prevailing in the valley proper, with which they are carried along in its direction. The breezes which come rushing from the mountain sides after and about sunset, ought not perhaps to be noted in ascertaining the directions of the wind in this valley as they are doubtless no more than currents of denser air, descending to take the place of more rarified volumes of atmosphere, but as these winds sometimes extend for a mile or two from the mountains, they are apt to mislead, as to the direction of the actually prevailing wind in the valley generally. Spurs from the mountains, which form bays or subordinate valleys protect these spaces from the influence of the prevailing current of air to the distances above noted. The average annual temperature of the air in the valley approximates that of the climates of the southern European countries: a circumstance which will explain the ready growth of the peach and pomegranate, wild and in the open air. The greater moisture of this climate than of those of southern Europe, explains the wonderful fertility of its soil in raising rice crops.* The following abstract of recorded observations, although insufficient for the purpose of settling with precision the mean temperature and pressure of the atmosphere of the valley gives an indication of it which may be usefully referred to, in comparing the course of the season, and the round of agricultural employments here, with those of India and Europe.

The mean height of the mercury in the barometer during the month of January, 1837, calculated from daily observations at 10 A. M. and 4 P. M. and reduced to the 32d degree of Fahrenheit's thermometer was 25.448 inches. The mean of similarly made odservations for the month of June, 1836, was 25.154. Taking these months respectively as those during which the mercury stands higher and lower than any others of the year, we have as the mean altitude of the mercurial column for the year, 25 inches, 301 thousandths or 3-10ths.

It is remarkable, that the months which shew the greatest elevation and depression of the barometer, should also exhibit *inversely* the highest and lowest degree of temperature throughout the year. The mean temperature of the air during the day outside and in the shade, for the month of June, 1836, calculated from observations taken at 10 A. M. and 4 P. M. was 78° of Fahrenheit's scale.

The mean of observations similarly made in January, 1837, was 47° of Fahrenheit's scale. The temperature of these two months, which exhibits the extreme of heat and cold during the year, gives as the mean annual temperature of *the day* at Cathmandu 62° of Fahrenheit's.† It is unnecessary to keep in mind here, that as no *night observations* have been quoted, the mean temperature of the 24 hours of these two months cannot be correctly stated, and further, that as the temperature of the day is at its maximum here, at 4 P. M. at which hour observations made have been quoted, the mean temperature of the day and night together, must be considerably below 62 degrees. The mean minimum temperature of January, 1837, calculated from observations taken by me from a self-registering thermometer, exposed to the air in a western verandah, was 32 degrees of Fahrenheit's scale. The mean maximum of observations taken by Captain Robinson at 4 P. M. for June, 1836, is, I find, 81°. If it is allowable to calculate the mean temperature of the year from the mean maximum of the day, during the hottest month, and from the mean minimum of the night, during the coldest month, we shall have 55° 3′ of Fahrenheit's scale as the mean annual temperature at this place. It is necessary to state, that this latter mode of striking the mean annual temperature is only given as subordinate to the first mode, as the mean minimæ taken by me, and the mean maxima by Capt. ROBINSON were from different instruments. The result is nevertheless of some interest pending the collection of a more full and correct body of meteorological facts. The mean annual temperatures of the air in some of the southern European countries as recorded by MALTE BRUN, affords a ready means of comparison between the climate of this valley, and the climates of those favoured countries. At Palermo, the mean annual temperature is rated at 62 degrees of Fahrenheit. The mean annual temperature of Lisbon is 60 degrees; that of Rome 59 degrees of Fahrenheit, and that of Paris 50°. The mean of these four climates gives a temperature of 55° ⅘ which is the mean annual temperature (according to the more recent authorities than MALTE BRUN), of Montpellier, the climate of which is unrivalled in Europe or out of it for salubrity to the human species.* The mean annual average of the day at Cathmandu, has been rated above at 62°. of Fahrenheit, and the mean annual temperature of the day and night at 55° 3′. By the first mode of calculating the average, we have at this place a mean annual temperature for *the day* exactly similar to the mean annual temperature of Palermo, while by the latter method, we have for the day and night a mean annual temperature corresponding to that of the sanatarium of all Europe, Montpellier. It is probable, that a temperature between the two, may be found to give the most correct estimate of the mean annual temperature of this valley, say 58° of Fahrenheit, which correspond with the estimate now before me of the climate of Montpellier by MALTE BRUN. The following tabular view will render the comparison of these climates more easy.† Fractional parts of a degree not being of much moment in quoting the indication of temperature by Fahrenheit's scale, are omitted.

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* The mean annual fall of rain north of the Alps is rated by Malte Brun at 25 inches. The fall south of the Alps at 25 inches. In this valley it was 50 inches in A. D. 1835.

† The observations for June, 1836, above quoted are by Captain Robinson; those for January, 1837, by myself, but with the same instruments kindly lent by Mr. Hodgson.

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* For a notice of the climate of Montpellier, see a paper by Dr. ROYLE in the Asiatic Society's Journal, which is not at present within my reach. MALTE BRUN rates the mean annual temperature of Montpellier as nearly the same as at Rome, viz. 59°, but Dr. ROYLE from more recent authorities states it at 55°.

† Whether I am correct or not in stating the annual mean temperature of Montpellier at 55°, does not materially signify, as the recorded statement of MALTE BRUN making it under 59° brings its estimate so far as temperature is concerned, wonderfully near that of this valley.

Table of Mean Annual Temperature by Fahrenheit's Thermometer.

	Valley of Nepaul during the day.	Valley of Nepaul for the day and night.	Palermo.	Lisbon.	Rome.	Paris.	Montpellier.	
							By Malte-Brun.	By more recent authority.
Mean annual temperature.	62°	58°	62°	60°	59°	50°	57°	55°

Course of the Seasons, with some of their more prominent distinguishing features.

The general characters of the seasons in this valley are, from its geographical situation, a good deal influenced by those of the neighbouring plains, but its elevation above them and its mountainous confines modify here the truly tropical character of the Tirhoot and Behar seasons to a close affinity with the seasons of the temperate zone. Cathmandu is situated in the 28th degree of N. latitude, and has an elevation of about 4,800 feet above the sea; but as it is admitted by competent authority,* that 600 feet of elevation is equivalent to one degree of latitude, in affecting the temperature of the air and climate of a country, it is necessary in fixing the latitude, to estimate it at 36 degrees, as the parallel line, on other parts of the earth, with the climates of which that of Cathmandu should correspond. A comparison with those of MALTE BRUN'S "European Sections of Climates," which occupy the line of lat. 36, corroborates this doctrine in so far as the average temperature is concerned, and also in some respects as regards vegetation.

Section 15 in lat. 35.43, includes the peninsulas and islands of Greece, as well as Crete and much of the Mediterranean. Section 16 in lat. 36.44½ includes "the state of Genoa, Tuscany, the states of the Pope, Naples, Malta and Corsica." Section 17 in lat. 36.43$\frac{1}{11}$ includes Spain and Portugal. In the first of these we have Palermo,† averaging 62° as the annual temperature. In the second, Rome, averaging 59°, and in the third, Lisbon, with a mean annual temperature of 60°. These temperatures correspond remarkably with ours, as do in some respects the vegetable productions of these countries. In the South of Italy, rice, oranges and myrtles abound. In the Mediterranean climate, " the scarlet flowers of the pomegranate, the elegant myrtle, and the fragrant exhalations of oranges obscured under a dark green foliage, convince the stranger that he is in the garden of Europe.* In the valley of Nepaul, the wild apricot, peach, pomegranate, and raspberry, the cultivated orange, fig, citron, quince and apple, and the finest odoured roses, myrtles, lilies, and carnations may well persuade the Anglo-Indian that he is not far from the garden of Asia.

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* DECANDOLLE, and so far as memory serves me, by HUMBOLDT.

† Palermo is in lat. 38°, although included in one of these sections of European Climates;

The year here with reference to vegetation may be correctly enough divided into five seasons, of which two are the most prominently marked, viz. the winter and rainy season; the former by the complete repose of vegetation and nature, as manifested by the russet hue of the grass, and the bare brown earth of the cultivated land; the latter by the excessive luxuriance and vigour of the vegetable world. Coming between the winter and rains, we have a pleasant spring, and a short summer, and between the cessation of the rains and winter, a bright and brilliant autumn. In a climate free from sudden vicissitudes of temperature during the day, as well as on the change of seasons, and remarkable for its equability, and temperate character, it is not easy to define the separate seasons by dated limits. But the following partitions of the year, have each their distinguishing marks in the vegetable kingdom, as well as to the animal senses. The winter commencing about the 15th November, and continuing till the 1st of March, is marked by heavy morning fogs, an average temperature in the house of about 48°, frequent hoarfrost at night, brownness and death of the grass fields, and the total absence of green (save towards its termination when the wheat gets up), from the arable land. The spring is ushered in on the early days of March, by occasional evening storms from the N. W., followed by showers of rain, or hail, a delightful breeze from the west, which is welcomed into every house by open doors, springs up at noon and blows till sunset. Quiet vernal showers are frequent; willow trees, apple trees and Indian lilacs, put forth their leaves and blossoms; the grass begins to sprout; the wheat fields are clothed in verdant hues; the birds begin to pair and sing, and nature throughout all her works is busy in reanimating her children, which for a while, were permitted to rest from their labours. Summer sets in with the month of May; storms from the N. W. with westerly breezes continue, and occasional showers give a refreshing coolness to the air, now sometimes heated to 80 degrees. The cultivator is employed in sowing rice, and reaping wheat, this short season combining the climate and labours of an English summer and autumn with the cultivator's operations during October and November, in the plains of India. The rains are ushered in as in Bengal by thunder and lightning, and usually commence at the same time as in Tirhoot and Sarun. With the first fall the transplanting of the great rice crop begins, and with their cessation the harvest of the spring sown, or upland rice. The rain falls frequently in torrents as in tropical countries, but often quietly and for days together, the sky being generally cloudy : vegetation of all kinds is now in its utmost vigour, the crops grow with an astonishing rapidity, and the grass requires incessant cropping or eating by cattle to keep it down. Early in September there is a considerable diminution of the temperature of the air ; thunder and lightning again commence. The rain falls more suddenly, and at longer intervals ; the sky becomes clearer, and less cloudy, and by the 15th of the month, a new season has fairly set in. This season (the autumn), is marked by the pleasant and congenial mildness of the temperature to the feelings. A bright day is preceded by morning fogs and succeeded by skies as clear, and mellow as those of Italy. The face of the country is now a variegated map of green and golden yellow, with every intermediate and bright tint from growing, ripening and ripe crops ; with the month of September the upland rice harvest commences, nor does the harvest throughout the valley meet with interruption until the end of November.

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* MALTE BRUN's Geography, vol. iii. p. 52.

The seasons as above slightly sketched are five. The winter commencing 15th November ; the spring commencing 1st March ; the summer, 1st May ; the rainy season, 15th June, and the autumn, 15th September. The winter lasts 3½ months ; the spring, 2 ; the summer, 1½ ; the rains, 3, and the autumn 2 months.

Concluding Remarks.—It occurs to me on coming so near the termination of these notes, that three subjects of much interest have been overlooked, and that however small the amount of information in my memoranda concerning them, it may still be worth transcribing. The first of these, viz. the diseases, or destructive agencies to which crops are subject here, will not occupy many lines.

The cultivators are familiar with what I have frequently observed here, and with what our English wheat crops are often injured by. The common term for the blackening of wheat ears is *smut*, regarded by the vulgar in Europe as well as here, as a disease. But a correct and rational explanation has been furnished by the Entomologists.* The insect known in England, whose destructive operations on wheat are precisely analogous to what is observed here, is a small orange coloured midge (Cradamya tritica), which deposits its eggs in the floret of the wheat, towards the end of June and throughout July.† The consequence of this is, that the anthers of the florets on which the larva feed when produced from the egg, are totally destroyed, and no seed is formed in the ear, which becomes black and powdered. This disease is not very general in Nepaul, but I have annually observed it to exist in the wheat crops, and although I have not seen the insect alluded to, I have no doubt that it is the cause of this effect. The wheat flowers in April, after which the smut appears. The depositing of its eggs in June and July in England, will not invalidate the idea of its being the same animal which lays its eggs here in April, as nature adapts the breeding seasons of all animals to the occurrence of the necessary favourable circumstances. The Newars attribute the smut to the state of the wind, or of the atmosphere, in general ungenial to the young wheat ear; but are disposed to believe that there is more of it in wet, than in dry spring seasons. Wheat alone of all the white crops is subject to smut. The next disease of crops prevalent here is, languishing and whitening of the young rice plants, when only a few inches above ground; this is attributed to the attacks of a large grub, called kiongki or root worm, of a black or blue colour, generally the thickness of the four finger, sometimes as thick as the thumb, and about two inches long. It is supposed by the natives to be produced, and to thrive best in rotten manure, and to devour the seed and young radicals of the plant. The kiongki is most destructive to the gohya or upland rice, attacking it soon after being sown, and continuing its ravages until about the middle of May, after which it ceases. The people do not know of what flying insect this grub is the larva, nor have they any remedy against its attacks except removing it from the fields when they see it. The third disease of white crops is a premature whitening of the ears of rice (both kinds), and the failure of the grain in them. This is attributed by the Newars to the attacks of a small grub the size of the common white maggot, the body of which is white, the head black and hard; it is called the *sheo-ki*, the marrow or pith worm.‡ The sheoki is supposed to eat the roots of the rice plants, but its prey more especially is said to be the stalk and juices of the plant; for obtaining the latter of which it cuts the plants at the joints, after which the ear whitens without filling. The natives attribute the drying up of the ear and plant, to the drinking of its milk (sap), by the grub, which prevents the due formation of a full sized grain. The visitation of locust flights is the only remaining evil to be contended with by the cultivators from the insect world. There have been three annual but trivial visitations of these destructive animals within the last five years. They arrived on these occasions in May, and remained four or five days each time. Whence they came or whither they went, could not be ascertained. The natives here say they come from the plains and from the west. The Newars indemnify their losses by the locusts by collecting them in large quantities and eating them. They remove the wings and either fry or make curry of them, and consider them very good. I have seen them dressed, and tasted the dish, but cannot praise its taste or flavour. The fruit trees of the valley gardens, are the prey of a most formidable and destructive species of grub. It is about an inch and a half long, sometimes bluish coloured, sometimes yellow; it makes its attacks on the roots as well as the stems of the apple, pear, plum, and apricot trees, drilling a hole like a gimlet right into their substance, where apparently revelling on their sap, and completes their ruin as fruit bearers, and often destroys their lives. When this animal makes its entrance into the stem from without and above ground, it leaves a round hole fit to receive a common pea, and sends out behind it small grains the colour of the tree wood, which on handling crumble into the finest powder.

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* Messrs. Kirby and Masham.

† See Natural History of Insects in Lardner's Cyclopædia.

‡ Ki in Newari is the generic term for worm or grub. Kiong is root, and sheo the marrow or brain of animals, and pith of trees and vegetables.

The appearance of these grains and their dry sapless structure induce the belief that they have been passed from the animal per anum.[*] The moisture of the soil, and warmth of the air during the rains conduce greatly to a profusion of insect life in the valley, and at that season the air actually teems with thousands of these busy creatures, none of which, save those above enumerated, are accused of being at all injurious to the cultivated productions of the country.

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[*] This grub is an inch and 1-8th long, 1-6th inch in diameter at the head, some thing in vent, as its head is the largest part and the body tapers to the tail. The head is a brownish red colour, and is formed of a very hard shell-like substance, on the anterior aspect of which there are a few delicate white hairs. The upper part of the mouth as well as both sides are formed of this shelly hard substance, the lower part of it, of a white soft substance like the body of the animal. The body is formed of twelve distinct rings of an uniform yellowish white colour. Along each side of the animal close to its belly is a row of brownish coloured spots, one on each ring. The animal has altogether 8 pairs of feet; distributed as follows: 3 pair sharp pointed directed towards and attached to the three first rings from the head; 4 pair shorter, close together, pointing to the ground, and to the 6th, 7th, 8th, and 9th rings; and lastly, 1 pair similar to the last or abdominal ones, at the vent attached to the last or 12th ring. Its body when cut open, discharges a thin clear and slightly viscid fluid, sap doubtless.

The next circumstance to be glanced at is an interesting one. The people employed in the cultivation of the valley are composed of two distinct races of men, which are divided into several totally different tribes. The Newars, who form by far the greater part of the agricultural classes (perhaps in the proportion of 6 or 8 to 1), personify in features, language to a considerable extent, in religion, and in usages, the Chinese or Thibetian race. The Brahmuns and the Khas of the Parbutteah division of the population represent the other or Indian race. The Mayars, Gurungs or Murmis, who form the remaining tribes, do not so readily admit of correct classification as these races.[*] The two former profess Hindooism and practice its ordinances in a very convenient and easily accomplished fashion. While the last, the Murmis, profess and practice the Boodhist religion and have a language like the Newars, indubitably derived from the trans-Himalayan stocks.

The Newars cultivate almost the whole of the land on the flats of both levels; they use the digging hoe exclusively for turning up the soil and live in towns and villages of tile and brick. The brahmuns and Parbutteahs are generally, if including Mayars and Gurungs, engaged in cultivating the soil. They occupy the confines of the valley, the subordinate valley which recedes from it, and the lands fit for yielding crops along the declivities of the mountain bases. These people use the plough partially, but not generally, and live in insulated cottages built of stone, or unburnt bricks, and generally thatched, rarely tiled.

The Murmis (indifferently distinguished by this name or by that of Bhooteas) cultivate generally the hill soils facing the valley, rarely holding lands on the flooded flats, and often extending their little patches of cultivated land and their mud and stone built and grass thatched cottages, to the very tops of the boundary mountains. The Murmis use the plough, but not often; their locations being generally much too steep for it. This is but a general indication of the localities of the different tribes employed in agriculture; individuals of these races and tribes, are to be met with in all parts of the valley and its confines. The Mewar however very rarely indeed leaves a village to fix himself on the mountain tops or sides, nor will the Murmi, if he can help it, live on the flat flooded parts of the valley. The brahmun's ubiquity is most conspicuous; he is to be found in the flatest parts, on the confines, and on the tops of the surrounding mountains; but as his numerous privileges, and holy character often enable him to be exempted from the exclusive drudgery of the field, his residence on the flooded flats arises generally from his desire of being near the larger towns and temples, whence he can visit the charity bestowing, and pious portions of the richer community, or exercise his vocation as a teacher of slokes or pronouncer of munters among people little able, or anxious as his rural neighbours generally are, to question his competency as an instructor and guide.

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[*] The whole mass of the population is readily referred by physiognomy and language to the Northern or Mongoul race, but is divisible by language dialectically; and by palpable varieties of the same caste of formed features; these divisions are for the whole kingdom, Limbu, Lapchu, Kiranti, Kacharia, Murmi, Newar, Jaria, Gurung, Mayar, Khas. The last is a mongrel race derived from an indigenous tribe so termed and from low land emigrants, chiefly of the sacred order, who have essentially modified the Tataric attributes of the Khas. The other tribes are still in speech and aspect Northmen, and most closely affiliated.—B. H. Hodgson.

PROCEEDINGS OF SOCIETIES.

Royal Asiatic Society.—Proceedings of the Committee of Agriculture and Commerce.

APRIL 8, 1837.

A COMMITTEE was held this day at one o'clock.

Present:—The Right Hon. C. W. Williams Wynn, M. P.; Sir Charles Forbes, Bart.; Sir George Thomas Staunton, Bart.; Colonel Briggs; John Fraser, Esq.; Dr. Horsfield; Louis H. Petit, Esq.; Colonel Sykes; Captain Harkness.

On the proposition that the Right Hon. Mr. Wynn, the President of the Society, do take the Chair, Mr. Wynn suggested that Sir Charles Forbes, who had taken so lively an interest in the success of the Committee of Agriculture and Commerce, should be elected its Chairman;

but that till that gentleman arrived, he would be happy to supply his place. This suggestion was unanimously agreed to, and

It was Resolved,—That Sir Charles Forbes be requested to accede to the nomination.

On the arrival of Sir Charles Forbes, the resolution of the Committee was communicated to him; to which having kindly acceded, he was duly elected Chairman of the Committee of Agriculture and Commerce, and he took the Chair accordingly.

The Secretary read the following Minutes of the Council of the Society:

"JULY 16, 1836.

"Resolved,—That the Committee of Agriculture and Commerce do consist of the President, Vice-Presidents, and Members of the Council, and of the following gentlemen:—the Hon. Mountstuart Elphinstone; Major-Gen. Sir Henry Worsley, K. C. B.; Sir Whitelaw Ainslie, M. D.; Colonel John Briggs; John Crawfurd, Esq.; James Cropper, Esq.; John Fraser, Esq.; Dr. Horsfield; M. Scott Moore, Esq. M. D.; John Forbes Royle, Esq."

"FEBRUARY 22, 1837.

"*Rules for the Committee of Agriculture and Commerce.*

"1st. That all Members of the Council be, *ex-officio*, Members of the Committee.

"2d. That Members of the Committee not Members of the Council, shall go out at the Anniversary, and that others from the general body of the Members of the Society shall be elected in their room; or the same Members may be re-elected. The election to be by ballot.

"3d. That the Committee do from time to time report their proceedings to the Council.

"4th. That any person not a Member of the Society, desirous of furthering the objects of the Committee, may be at liberty to subscribe for the same.

"5th. That all subscriptions for such objects be kept separate from the general fund of the Society, and applied to the objects of the Committee only.

"6th. That all subscribers of one pound and upwards be entitled to copies of all printed proceedings of the Committee."

Resolved,—That the Committee are anxious to relieve the Secretary of the Society at the earliest practicable period at which their funds will permit, from this additional call on his time and exertion; but in the mean while, they hope that Captain Harkness will have the goodness to conduct the business of the Committee.

Resolved,—That the Secretary be authorized to obtain occasional assistance, at an amount of expense not exceeding sixty pounds per annum.

A mass of Papers were submitted to the Committee, containing the Replies of the several Collectors under the Presidency of Madras, to Queries suggested by Mr. M'Culloch, on statistics, manufactures, commerce, &c., and transmitted to India by the Committee of Correspondence of the Society.

Resolved,—That these papers be conveniently arranged for reference; and that a list of the Queries, with marginal notes indicating the corresponding number of the Reply, the places from which, and the persons by whom answers have been returned, be prepared.

Resolved,—That Mr. M'Culloch be informed of the receipt of the replies to his queries from Madras; and that he have access to the same.

Read the following communications:—

1st. From Mr. Harman Visger, of Bristol, on Lichens, with specimens, &c. &c.; and expressing his conviction that the extensive regions of the East must produce, in abundance, some of the known, and many of the unknown, though probably not less valuable, Lichens available for dyeing; that a large and certain supply of good sorts would greatly stimulate the consumption, which has been much checked by the short supply and high price of the best-known Lichens used for dyeing; that, at present, he estimates the annual import at from 60,000*l* to 80,000*l*.; that he would be happy carefully to test any specimens that may be sent to him, and to report on them; and that he had sent to the Committee such specimens of Lichens as he had then been able to procure, with a list and paper of instructions, not confined merely to them, but comprising others which he would send so soon as he could procure them.

2d. From Mr. Southey, of Coleman Street, on East Indian Wool, with specimens, &c. &c.

3d. Extract of a Letter from Messrs. Forbes and Co., of Bombay; on Indian Iron.

Resolved,—That the thanks of the Committee be returned to these gentlemen for their kind attention; and that the list of Lichens and paper of instructions drawn up by Mr. Visger, and the letter from Mr. Southey, be printed in this day's proceedings.

Resolved,—That the specimens of Lichens furnished by Mr. Visger, of the ammoniacal liquor for extracting the colour, and of the colour required, be sent to the different Presidencies of India, and to Ceylon and China, through the medium of the home and local Governments, and to the several Horticultural and Agricultural Societies already established in India; and that fifty copies of the Committee's Proceedings of this day accompany each assortment of the specimens.

Resolved,—That the subject of Mr. Southey's communication on East Indian Wool, and of the extract of a letter from Messrs. Forbes and Co., of Bombay, on East Indian Iron, be allowed to lie over until the result of the examination of the expected investments of those articles be known.

Read a letter from the Horticultural Society of London, dated the 31st ultimo, enclosing a paper of proceedings of the Meerut Horticultural Society, and the report of the Members of the Committee to whom these communications had been referred.

Resolved,—That extracts from the paper of proceedings of the Meerut Horticultural Society be published in the Committee's proceedings of this day; and that in all similar cases, papers be referred to particular Members for their report thereon.

Professor Royle suggested that specimens of the species of Lichen used in India for the purpose of dyeing (one of which is extensively employed in the Northern provinces, and is there called Chulcheleera), be obtained, and sent to Mr. Visger for the purpose of being submitted to experiment.

Resolved,—That the Committee take measures to obtain specimens of those Lichens; and that they be sent to Mr. Visger for experiment.

An offer was made by Professor Royle, to furnish a list of all the plants of India which yield oil.

A similar offer was made by Colonel Sykes, with reference to the plants of the Dekkan which are suitable to the purposes of domestic economy.

Professor Royle also promised to prepare a paper on the subject of Caoutchouc, and to submit it to the Committee, at as early a period as his present numerous avocations would permit.

Resolved,—That the Committee will be happy to avail themselves of the kind offers of Professor Royle and Colonel Sykes.

Resolved,—That J. G. Malcolmson, Esq., be nominated a Member of the Committee.

Resolved,—That letters be addressed to the Horticultural and Agricultural Societies of India and of England, expressive of the wish of this Committee, to enter into communications with them on all subjects of mutual interest to the respective institutions.

LIST WHICH ACCOMPANIED MR. VISGER'S SPECIMENS OF LICHENS, &c.

" *Lichens of Commerce.*

No. of Specimen.	Commercial Name.	Botanical Name.	Value per Ton.
1.	Canary Orchilla Weed	Lichen Rocella..	250*l.* to 350*l.*
2.	Cape de Verde ditto....	——	200 to 300
3.	Western Island ditto....	——	150 to 230
4.	Madeira ditto...........	——	100 to 150
5.	African ditto..........	——	80 to 120
6.	South American ditto..	——	80 to 120
7.	Sardinian ditto.........	——	30 to 45
8.	Cape of Good Hope do..	——	20
9.	English ditto..........	——	No commercial value
10.	Canary Rock Moss....	Unknown....	80 to 90
11.	Sardinian ditto.......	(supposed) Pustulatus	70 to 90
12.	Pustulatus ditto, of Sweden, Norway, and England....	Lichen Pustulatus, or Gyrophera..	20 to 40
13.	Tartarous Moss......	Lichen Tartarus..	20 to 40

" *Lichens liable to be mistaken for those of Commerce, but possessing no value.*

No of Specimen.	May be mistaken for	Points of Difference.
21.	Nos. 1 to 9.	The bad is flat, and has a bitterish taste; the good is cylindrical, and not bitter.
22.	No. 12.	The difference is apparent, but the Villous is generally more or less mixed with the Pustulatus whenever collected.
23.	No. 10.	The great similarity between the good and bad Canary Mosses, renders, the collection of the good a matter of some difficulty.

" *The Good* has a nearly white powder on its surface, towards the centre; the under surface is of a gray colour, and is not hairy; if wetted it does not turn of an orange colour; its edges are flat and thin.

" *The Bad* has no mealy white powder on its surface; its under side is hairy, and blacker than the good; its edges are usually more or less knobbed, and on being wetted it generally becomes of an orange colour.

" No. 24, contains a mixed sample of good and bad, which has been wetted with water.

" The useless Mosses greatly outnumber the useful, and vary from each other, in some instances, by such slight shades of difference, that the above specimens of them can serve little more than to call minute attention to the subject. A *test* for the discovery of colour is therefore necessary.

" *Test.*—Take liquor ammoniæ, very much diluted with water, but strong enough to retain a powerfully-pungent smell—half-fill a phial bottle with the same, then add of the Lichen (being broken up to a convenient size), so much as will lightly fill up the liquor, so that the whole may be readily stirred about. Care must be taken to leave at least one-third of the bottle for air. The bottle must be kept corked, but be frequently opened, and the contents stirred with a small stick. The colour will begin to exhibit itself in a few hours, and the more rapidly in proportion to the warmth of the place in which it is kept; but the heat should not exceed 130° Farenh. A piece of white silk placed near the surface of the fluid will show the colour before it would otherwise be perceptible. This test will only serve to show where colour exists, but will not develop it to its fullest extent.

" *Localities.*—The good sorts are generally found in rocky or stony districts, or where dry stone walls abound; in the neighbourhood of the sea,—or if distant from the sea, in places exposed to sea breezes. The more valuable are met with in volcanic islands. My own experience has been principally in the Canaries, where I find the more arid the situation, the better the quality of the Lichens. When the land is high and humid, the useless sorts alone are met with. In dry places near the sea, there are only the good sorts; and there is generally a belt between the two, in which both good and bad are found on the same stones, and not unfrequently overrunning each other.

" There is with the samples a small bottle of ammoniacal liquor, of the strength suited for test; and also a small bottle of the colour to be produced."*

MR. SOUTHEY'S COMMUNICATION.

"*London*, 24*th Nov.* 1836.

"WE have much pleasure in offering you the following observations on the Wool imported into this country from Bombay, by which you will perceive there is in India a race of sheep which produces Wool that can be applied to useful purposes in some of our manufacturing districts; at the same time it will be seen that, with due attention to the assortment of the Wool, and to the improvement of the breed of sheep, a more valuable description of Wool may be produced.

"Most of the Wool which has hitherto been imported into this country from India, has been found of a short staple, with a vast quantity of hairs interspersed through the Wool (what is technically called kemp hairs): they will not receive dye, which renders such Wool unfit for general use, and consequently confines its application to the more ordinary branches of manufacture, such as blankets, and other low quality of goods.

"It evidently appears there are various descriptions of Wool produced in India, as we have seen some of a superior quality, which we are given to understand was produced in the province of Guzerat, some of which we estimate to be worth 15*d.* to 18*d.* per lb.

"The whole of the Wool hitherto imported from thence, came from the island of Bombay, we are therefore unable to form an opinion where the Wool is grown; but should the information we have obtained prove correct (that it is produced in Guzerat, and that that portion of the province is under British sway), it may be deserving consideration, whether an improvement in the quality of the Wool would not prove an advantage to this country.

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* The Government of Madras, to whom the samples and test were sent by the *Royal Asiatic Society*, has forwarded them to the Literary Society, in whose Apartments they may be seen by any one desirous of inspecting them. Dr. Wight has made drawings of the lichens which have been transferred to stone, for the purpose of preparing representations, to make them better known. These will either appear in a future Number of this Journal, or be circulated over India, to aid the views of the Committee of Agriculture and Commerce of the Royal Asiatic Society.—EDITOR *Madras Journal.*

"Under this assumption, we shall proceed to make the following observations :—

"During last year, there was imported into London 773 bags of Indian Wool, and into Liverpool 624.

"1397 bags—these were sold at public auction, at 4¼*d.* to 14½*d.* per lb. They were chiefly white, and well washed: there is occasionally found a few black locks interspersed through the bags, which ought to be carefully excluded, as the Indian sheep's Wool is generally applied to the manufacture of white goods, consequently any admixture of coloured Wool tends to deteriorate its value.

"We have discovered amongst the finer qualities of Indian Wool, a considerable portion of yellow and discoloured locks, which operates very materially against its sale. In order to remove such an objection, it is requisite the discoloured wool should be selected from the white, and each kind packed in separate bags, by which means an increased competition for the article would be produced; at the same time its value would be thereby enhanced. To which we may further add, the Wool would be bought with greater avidity, as it could then be immediately applied to the various purposes of manufacture without further trouble or expense.

"To those who may feel the laudable desire of producing an improvement in the breed of sheep, and quality of their Wool, we would recommend the introduction of some of our best-woolled English rams amongst the Indian ewe flocks, as by so doing, the quality of the Wool would be materially improved, inasmuch as it would thereby become both a better and more useful class of Wool; at the same time the quantity would also be considerably augmented.

"We remain, Gentlemen, &c."

APPENDIX.

MADRAS, 15*th October*, 1837.

SIR,—I have now much pleasure in sending you a specimen of the work spoken of at page 74 of the last Number of the Journal. The plant figured is a new species of the natural order *Asclepiadæ*, nearly the whole impression of which has been struck off from my own press. I may here observe that I am well aware of my present imperfections in the difficult art of Lithography, but, as every successive trial exhibits some improvement on the preceding one, I am encouraged to anticipate ample success, when some further practice has conferred skill in the management of the press and in the performance of the various manipulations to be gone through in the process of printing from stone, and trust that my first number will afford satisfactory evidence of the style in which the work will be finished; thinking, at the same time, that the specimen now put forth may be looked upon, all things considered, as an earnest that the work itself will be found an useful aid to Indian botanists and by no means discreditable to the state of the arts in India.

Emboldened by this early success, it is with no ordinary feelings of satisfaction, that I contemplate the prospect which it holds out, of enabling me to carry into effect a design which ten years ago I was preparing to enter upon, the publication, namely, of a series of figures of Indian plants, under the title of *Illustrations of Indian Botany*: success being rendered more certain by the advantages derivable from my present official situation, as the work may be looked upon as part of the duties of my office; and, in this light, has received the sanction and approbation of the Madras Government.

These Illustrations have been undertaken in the hope of effectually aiding the advancement of botanical science among us, and thereby extending our acquaintance with numerous curious and useful plants, the value of which is known to few, or the knowledge is confined to particular districts, though the plants themselves may be widely distributed; and in the not less cheering expectation of permanently bringing to light, under systematic denominations, many others endowed with the most valuable medicinal properties, of which I have received, from really competent observers, accounts so satisfactory, that they could not fail to produce a strong feeling of regret, that the narrators were unqualified to give me more perfect information regarding them. Specimens of such, gathered when in flower, and dried between the leaves of a book, or a few sheets of paper, in the manner detailed in a former communication,* might easily be transmitted from any part of India, if packed between the boards of an old book, or in stiff paper, and prove of the greatest value, especially if accompanied with notes detailing their uses, and mode of preparation; and as, in the composition of these notes, no scientific knowledge is required, I trust I shall be favoured with many such communications.

Botany has hitherto spread with tardy steps among us, the catalogue of Indian botanists having never, at any one time, comprised more than a few names: her most palmy days having undoubtedly embraced the concluding years of the last, and first quarter of the present century; during which, Koenig, Roxburgh, Rottler, Klein, Heyne and Buchanan Hamilton flourished.

When we contemplate the impediments which these truly great men had to surmount in arriving at the eminence they justly attained in their favourite pursuit, partly originating in the imperfection of books treating of Indian plants, and partly from the engrossing duties they had to perform, the intervals of which, only, they could devote to botany, we cannot too much admire their perseverance and devotion to science; while they afford a striking example of how much may be done by a skilful division of our time, and a careful appropriation of our leisure to scientific pursuits.

While we thus admire their industry in obtaining knowledge, we equally regret that, with the exception of the illustrious Roxburgh, leisure sufficient was not granted to any one of them to leave a comprehensive written record of the extent of his acquirements, for the benefit of succeeding labourers in the same field: hence, we are constrained to acquire much of our knowledge of Indian plants, in the same roundabout way that they did, that is, from general systems of Botany (greatly enriched by them, certainly), in place of local Floras.

These systems, embracing as they do the vegetation of the whole globe, are necessarily very concise, and the species so briefly described, as not seldom to render it next to impossible to identify the plant from its specific character. One object of the present work is to remedy, in some degree, this defect, which even the most carefully drawn characters, cannot always avoid, owing to the inadequacy of language to find terms sufficiently precise for the designation of the innumerable forms which the vegetable kingdom presents, and especially for distinguishing the varying forms which the same plant, when produced under circumstances tending to increase or diminish its luxuriance, is apt to exhibit.

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* See No. 15, p. 429.

The insufficiency of language alone, to convey just ideas of the forms of natural objects, has led naturalists, ever since the invention of engraving, to have recourse to pictorial delineation, to assist the mind through the medium of the senses; and, prior to the time of Linnæus, not without good cause, since nothing could be more vague than the language then employed in description. Impelled by this cause, the number of figures some of the older writers published, is truly astonishing. The precision of modern scientific language, the generalization of the innumerable objects of natural history into classes, orders, tribes, and families, and the accuracy and minute details which the representations of recent artists present, have fortunately all combined to diminish the necessity for the innumerable figures of the older naturalists, the latter cause having increased their cost so greatly, as materially to diminish their production, even to the extent required for the elucidation of the rapid advances natural history is now making.

The vegetable treasures of India have undoubtedly been highly honoured by the magnificence of the works dedicated to their illustration, as those of Rheede, Roxburgh, and Wallich, amply testify; but, unhappily for science, the first is very rare, and they are all so costly, that few can afford to purchase them, while, from their size, they can only be conveniently consulted in the library. In spite, however, of these drawbacks to their more general use, they have been of immense service to Indian Botany, and are alike honourable to their authors and to the countries which produced them, while the value of the last is vastly enhanced, by several very admirable memoirs on different natural orders by some of the most distinguished living botanists.

The work which I am preparing to enter upon, is of a humbler, but I hope not less useful, description; its object being to furnish, at the cheapest possible rate, a series of accurate figures of plants, with copious analysis of the parts of fructification, so as, in the words of a highly talented correspondent (the author of the tabular view of the generic characters of Roxburgh's Flora Indica), to supply the Indian botanical amateur with the 'one thing needful' towards acquiring a correct knowledge of the principles of the natural method of classification, by presenting him with a series of diagrams, if I may so call them, which he can compare, point by point, with the written characters of the natural orders, selecting for illustration, as often as circumstances will permit, such plants as are valued on account of their useful properties.

In inviting public support to an undertaking of a kind so novel in Madras, it is necessary to give some information regarding the plan and cost of the work, though neither can as yet be said to be definitively determined upon. Several plans have suggested themselves, but the following seems to merit the preference.

The quarto size will be adopted, as affording more room for analysis and freer scope to the artist in making the drawings, a very considerable number of which are already prepared. The figures are to be coloured, and on each, in addition to the name of the order and plant figured, it is proposed to write the *Tamul* and *Teloogoo* and occasionally other names, in both native and Roman characters ; and, lastly, each plate, in addition to its own number, will have the general number of the species in my Prodromus, if the plant is already described there, to facilitate reference, and after arrangement, should that become necessary. The letter press, in place of (as usual in such works) consisting of simple descriptions of the plants figured, and which can be little else than repetitions of the characters already published in the Flora, will, in the hope of rendering this portion of the work more generally useful and agreeable to both the botanical and general reader, be devoted to remarks illustrative of structural peculiarities; the valuable properties which predominate, either in the individual figured, or in the order to which it belongs; the methods adopted for procuring these, and peculiarities of culture, where such are required in their production.

In extent, it is not expected to exceed three hundred plates (but may possibly fall short of that number), to be published at the rate of about one hundred annually, in numbers, commencing in January 1838, or so soon as the names of one hundred subscribers are received ; and continued, either monthly or every alternate month, as may be found most generally convenient and economical. The estimated cost to subscribers will not exceed thirty rupees, per volume of one hundred plates; one half of which is the cost of colouring alone, the remainder being charged for the letter press (which will be copious), lithography, paper, drawing, &c., and at this price it is nearly fifty per cent. under the English price of similar works.

This low price is effected by charging little more than the actual cost; it forming no part of my plan to reap personal profit from a work, the conducting of which I look upon as part of my present official duties. But, as it cannot expected that I should be a loser

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by my public engagements, I think it necessary to add that prompt payment is indispensable to the continuance of the publication; as it is quite impossible for me to carry on so costly a periodical from my own very limited resources, and on these alone it must mainly depend in the outset. In England, authors of such works are differently situated. There, they contract with a publisher, possessed of the means of continuing the publication until the probability of remuneration is ascertained; but he, to remunerate himself for the risk and sacrifice of capital at the outset, charges a profit of from 30 to 40 per cent. on the cost, while he enjoys every facility which former experience, and the advanced state of the arts in Europe, give, to ensure the work being got up in the best style and at the lowest charge. In Madras the case is totally different: this is the first publication of the kind ever attempted here; we are, therefore, without experience, have no practised publishers, no colourists, find it even very difficult to get colours, and must depend on the chance of the market for our supplies of paper, in place of ordering it direct from the maker, of whatever size, quality and price might appear most suitable; here, in short, every thing must be done for the first time. I mention these incidental sources of disappointment in anticipation, lest imperfections should occur at the outset which might be unavoidable in Madras, but which, in more favourable circumstances, would justly merit censure.

In conclusion, a few words are required to make known the accompanying figure. The genus *Boucerosia* was first established in my Contributions to the Botany of India, and then consisted of two species only, *B. umbellata* and *B. crenulata;* both of these are at once distinguished from the present, by having their flowering branches terminated with a many flowered umbel, of rather long pedicelled flowers, whereas in this they are solitary, or few, and short pedicelled; thus forming a second section in the genus, which may now stand thus :—

§ I. Floribus umbellatis
    Umbellis multifloris.
    B. umbellata corollæ segmentis glabris.
    B. crenulata corollæ segmentis longe fimbriatis.
§ II. Floribus subsolitariis.
    B. pauciflora corollæ segmentis ciliatis.

To ROBERT COLE, ESQ.
Editor to the Madras Jour. of Lit. and Science.

Yours very faithfully,
ROBERT WIGHT.

Days.	4 A. M.	10 A. M.	4 P. M.	10 P. M.	4 A. M.	10 A. M.	4 P. M.	10 P. M.	Sun rise.	Sun set.	Evaporation.	4 A. M.	10 A. M.	4 P. M.	10 P. M.	4 A. M.	10 A. M.	4 P. M.	10 P. M.
1837	Inch.	Inch.	Inch.	Inch.	°	°	°	°	In.	In.	In.								
July 1	29,832	29,906	29,792	29,850	82,3	85,8	90,3	86,0	0,097	... ...	... ...	S W	W	N W	S W	Cloudy	Haze	Cloudy	Cloudy, lightning.
2	,800	,866	,760	,802	84,8	86,4	91,0	85,0	... ...	... ...	... ...	W	W	W	swbyw	Cloudy	Cloudy	Cloudy	Cloudy do.
3	,756	,816	,730	,800	84,6	86,0	90,0	87,0	... ...	... ...	... ...	S W	S W	W	S W	Cloudy	Cloudy	Fl. cl.	Clear do.
4	,778	,854	,754	,844	84,5	86,3	90,0	86,4	... ...	... ...	... ...	S W	swbyw	S S W	Calm	Clear	Clear	Cloudy	Cloudy do.
5	—	,882	,756	,884	—	85,9	91,0	84,2	0,107	... ...	3,708		W	S E	S W		Th. haze	Fl. cl.	Rain do.
6	—	,908	,792	,800	—	86,9	90,0	82,4	... ...	... ...	... ...		S W	S S E	S		Th. haze	Cloudy	Cloudy do.
7	—	,900	,792	,884	—	87,5	88,2	83,5	... ...	... ...	... ...		W	S S E	Calm		Clear	Cloudy	Cloudy do.
8	—	,910	,804	,874	—	86,3	88,0	85,0	0,108	... ...	... ...		S W	S S E	S		Haze	Fl. cl.	Fl. cl. do.
9	—	,874	—	,832	—	87,0	—	84,3	... ...	... ...	... ...		S W	—	S		Clear	—	Fl. cl. do.
10	—	,900	29,802	—	—	87,4	89,8	—	... ...	... ...	... ...		W	S E	—		Clear	Fl. cl.	— do.
11	—	,912	,772	29,838	—	87,6	88,2	84,2	... ...	... ...	... ...		W	S S E	S		Haze	Fl. cl.	Clear do.
12	—	,860	—	—	—	87,9	—	—	... ...	... ...	3,951		W N W	—	—		Clear	—	— do.
13	—	,860	29,755	29,832	—	86,3	92,0	84,4	0,259	... ...	... ...		swbyw	S W	S		Haze	Haze	Clear do.
14	—	,898	,750	,910	—	86,0	89,5	84,9	... ...	... ...	... ...		N W	S E	S S W		Haze	Haze	Clear do.
15	—	,952	,864	,936	—	86,8	88,0	84,4	... ...	... ...	... ...		W	S E	S		Haze	Th. haze	Clear do.
16	—	,928	—	,864	—	87,5	—	84,1	... ...	... ...	... ...		S W	—	S		Clear	—	Haze do. [ltg. &rain.
17	—	,856	29,752	—	—	86,8	88,0	—	... ...	... ...	... ...		S W	S S E	—		Clear	Fl. cl.	Brisk squall 5 A. M. thr.
18	—	,916	,840	29,928	—	83,3	87,0	83,8	0,185	... ...	... ...		swbyw	S	S		Haze	Th. haze	Clear, lightning.
19	—	,952	,860	,914	—	86,3	90,0	84,2	... ...	... ...	3,652		W	E N E	S		Clear	Clear	Clear do.
20	—	,904	,816	—	—	86,4	88,0	—	... ...	... ...	... ...		N W	E S E	—		Clear	Haze	— do.
21	—	,870	,864	—	—	86,1	85,5	—	... ...	1,274	... ...		N W	W	—		Haze	Cloudy	— do. thunder.
22	—	,920	,854	—	—	80,7	83,5	—	... ...	0,427	... ...		S W	swbys	—		Cloudy	Cloudy	— do. do.
23	—	,922	—	29,902	—	82,8	—	82,6	... ...	... ...	. ...		W	—	S		Haze	—	Cloudy do.
24	—	,906	29,814	,876	—	82,4	86,5	82,3	0,097	... ...	... ...		S W	S W	S		Cloudy	Th. haze	Cloudy do.
25	—	,886	,802	,850	—	82,4	84,5	84,0	... ...	... ...	... ...		S W	N W	S		Th. haze	Cloudy	Haze do.
26	—	,868	,768	,828	—	84,2	87,7	85,0	... ...	... ...	2,832		S W	W S W	S		Th. haze	Cloudy	Th. do. do.
27	—	,868	,756	,852	—	84,7	90,0	87,2	... ...	... ...	... ...		S S W	W S W	S W		Haze	Cloudy	Haze do.
28	—	,884	,772	—	—	86,4	91,7	—	... ...	... ...	... ...		swbyw	W S W	—		Clear	Fl. cl.	— do.
29	—	,916	,768	29,850	—	87,2	91,0	85,4	... ...	... ...	... ...		S W	E S E	S W		Clear	Fl. cl.	— do. thunder.
30	—	,896	,808	—	—	85,9	87,7	—	0,100	... ...	... ...		S W	S E	—		Clear	Fl. cl.	— do. do.
31	—	,880	,802	29,896	—	87,2	88,0	84,6	... ...	... ...	... ...		S W	E S E	S		Clear	Fl. cl.	Th. hs. do.
Mean	29,798	29,803	29,793	29,863	84,0	85,8	88,7	84,6	... ...	... ...	... ...								

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY, FOR THE MONTH OF AUGUST 1837.

Days.	Barometer at				Thermometer at				Rain.		Evaporation.	Direction of Wind.				Weather.			
	4 A. M.	10 A. M.	4 P. M.	10 P. M.	4 A. M.	10 A. M.	4 P. M.	10 P. M.	Sun rise.	Sun set.		4 A. M.	10 A. M.	4 P. M.	10 P. M.	4 A. M.	10 A. M.	4 P. M.	10 P. M.
1837	Inch.	Inch.	Inch.	Inch.	°	°	°	°	In.	In.	In.								
Aug. 1	—	29,908	29,804	29,894	—	86,4	85,0	83,8	... ...	0,494	... ...		S W	S E	S		Haze	Cloudy	Cloudy th. litng.
2	—	,938	,816	,890	—	84,5	88,0	83,7	0,327	... ...	3,662		S W	S	S W		Clear	Fl. cl.	Clear lightning.
3	—	,956	,846	,880	—	84,4	88,0	85,0	0,117	... ...	... ...		W	W N W	S		Haze	Th. haze	Haze do.
4	—	,912	,832	,912	—	82,4	89,0	84,2	0,037	... ...	... ...		S W	W N W	S		Cloudy	Th. haze	Cloudy do.
5	—	,900	,826	,924	—	85,3	85,5	84,4	... ..	... ...	... ...		W	N W	S		Haze	Drizzling	Cloudy do.
6	—	,924	,852	,922	—	84,8	87,8	84,0	... ...	... ...	... ...		N W by W	E S E	S		Cloudy	Th. haze	Clear do.
7	—	,924	,852	,924	—	86,5	86,4	84,4	... ...	... ...	... ...		N W	S S E	S		Haze	Th. haze	Clear th. litng.
8	—	,946	,824	,916	—	86,3	88,2	85,3	... ...	... ...	... ...		S W	S E	S W		Clear	Clear	Cloudy do.
9	—	,936	,828	,910	—	85,4	88,2	84,5	... ...	... ...	2,745		W	E S E	S		Clear	Clear	Fl. cl. do.
10	—	,916	,808	,904	—	86,3	88,5	86,0	... ...	... ...	... ...		S E	S S E	S		Clear	Clear	Haze lightning.
11	—	,908	,810	,924	—	85,8	86,5	85,5	... ...	... ...	... ...		N W	S E	S E		Clear	Th. haze	Fl. cl. do.
12	—	,928	,836	,900	—	87,3	87,5	84,4	... ...	... ...	... ...		N W	W	S		Th. haze	Cloudy	Clear th. litng.
13	—	,902	,800	,884	—	86,5	88,5	85,0	... ...	... ...	... ...		N	E	S S W		Clear	Clear	Cloudy do.
14	—	,876	,826	,900	—	85 8	89,5	84,0	... ...	... ...	... ...		S W	E	S		Haze	Cloudy	Cloudy do.
15	—	,864	,796	,874	—	80,2	85,6	84,0	0,300	... ...	... ...		N W	W	S W		Cloudy	Cloudy	Cloudy do.
16	—	,890	—	,884	—	83,4	—	83,8	0,100	... ...	3,171		W	—	S W		Cloudy		Cloudy do.
17	—	,894	29.832	—	—	81,9	83,0	—	... ...	... ...	... ...		W	W	—		Cloudy	Cloudy	— do.
18	—	,872	,788	29,854	—	81,3	84,4	82,9	... ...	... ...	... ...		W	N W	N W		Cloudy	Cloudy	Cloudy do.
19	—	,854	,742	,873	—	81,8	84,3	—	... ...	... ...	... ...		W	N W	N W		Cloudy	Cloudy	— do.
20	—	,845	,732	,866	—	82,0	88,0	85,6	0,287	... ...	... ...		W	S W	S W		Fl. cl.	Fl. cl.	Cloudy do.
21	29,844	,914	,802	—	82,2	84,3	89,0	—	... ...	... ...	... ...	S W	S W by W	S W	—	Clear	Haze	Fl. cl.	— do.
22	,870	,926	,802	29,894	82,2	85,4	89,7	86,8	0,027	... ...	... ...	S W	S W by W	W N W	S W	Haze	Clear	Fl. cl.	Cloudy do.
23	—	,910	,792	,890	—	86,3	90,0	88,0	... ...	... ...	2,692		W	W S W	S W		Haze	Cloudy	Cloudy do.
24	—	,916	,792	,890	—	88,2	91,0	88;0	... ...	... ...	... ...		W	W S W	W		Haze	Cloudy	Haze do.
25	—	,918	,782	,882	—	87,8	90,0	87,8	... ...	... ...	... ...		W	W S W	S W		Haze	Cloudy	Cloudy do.
26	—	,908	,784	—	—	86,5	88,4	—	... ...	... ...	... ...		W	S W	—		Cloudy	Cloudy	— do.
27	—	,870	—	29,842	—	87,5	—	85,9	... ...	... ...	... ...		S W	—	S		Cloudy		Clear do.
28	—	,874	29,764	,854	—	87,7	92,0	84,8	... ...	... ...	... ...		W	S W	S		Clear	Fl. cl.	Clear do.
29	—	,920	,816	,930	—	87,4	92,0	84,5	... ...	... ...	... ...		S W	W S W	S		Clear	Clear	Clear —
30	—	,982	,852	,970	—	87,8	89,0	85,5	... ...	... ...	3,140		S W by W	S S E	S E		Th. haze	Fl. cl.	Cloudy th. litng.
31	—	,976	,824	,920	—	87,3	89,5	86,5	... ...	... ...	... ...		W N W	E S E	S S E		Clear	Cloudy	Cloudy do.
Mean	29,857	29,910	29,809	29,897	82,2	85,3	88,0	85,1											

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY, FOR THE MONTH OF SEPTEMBER 1837.

Days.	BAROMETER AT				THERMOMETER AT				RAIN.		Evaporation.	DIRECTION OF WIND.				WEATHER.			
	4 A. M.	10 A. M.	4 P. M.	10 P. M.	4 A. M.	10 A. M.	4 P. M.	10 P. M.	Sun rise.	Sun set.		4 A. M.	10 A. M.	4 P. M.	10 P. M.	4 A. M.	10 A. M.	4 P. M.	10 P. M.
1837	Inch.	Inch.	Inch.	Inch.	°	°	°	°	In.	In.	In.								
Sep. 1	—	29,900	29,804	29,854	—	87,4	89,7	87,3	... ...	... ...	... ...		W	S E	S		Cloudy	Cloudy	Cloudy lightning.
2	—	,908	,812	,893	—	86,6	91,0	85,2	... ...	... ...	... ...		swbyw	S W	S E		Haze	Th. haze	Rainy do.
3	—	,981	,852	,950	—	86,2	89,0	86,2	0,075	... ...	... ...		W	S W	S		Th. haze	Th. haze	Haze do.
4	—	,968	,826	—	—	87,0	91,5	—	... ...	... ...	... ...		S W	S W	—		Clear	Cloudy	—
5	—	,926	,812	29,944	—	86,4	90,0	87,1	0,027	... ...	... ...		N W	E S E	W N W		Th. haze	Cloudy	Cloudy do.
6	—	,936	,868	,894	—	85,3	91,5	85,6	0,105	... ...	3,265		Nwbyw	W S W	S E		Th. haze	Cloudy	Cloudy do.
7	—	,934	—	,890	—	86,3	—	84,2	0,127	0,248	... ...		W	—	S W		Th. haze	—	Cloudy do.
8	—	,928	—	,916	—	85,7	—	84,1	......	... ...	... ...		S W	—	S		Th. haze	—	Cloudy do. & th.
9	—	,920	29,802	,886	—	83,9	90,0	82,8	0,652	... ...	... ...		W	N W	S		Cloudy	Fl. cl.	Fl. cl. do.
10	—	—	,806	,896	—	—	87,0	84,4	... ...	... ...	... ...		—	S S E	S		—	Cloudy	Cloudy do.
11	—	29,920	,824	,928	—	85,2	88,0	85,9	... ...	... ...	... ...		S S W	S S E	S		Clear	Clear	Cloudy do.
12	—	,950	,852	,940	—	85,8	88,0	84,2	... ...	... ...	... ...		W	S S E	S W		Clear	Clear	Fl. cl. do.
13	—	,998	,884	,978	—	86,2	88,0	83,8	... ...	... ...	3,578		S W	S E	S E		Clear	Clear	Clear do.
14	—	30,030	,882	,972	—	85,8	87,4	82,3	0,412	... ...	... ...		S W	S S E	S		Fl. cl.	Clear	Clear do.
15	—	,030	,880	,990	—	85,0	87,0	82,5	... ...	... ...	... ...		S W	S S E	S		Fl. cl.	Clear	Fl. cl. —
16	—	,028	,890	,956	—	84,4	86,0	82,3	... ...	... ...	... ...		S E	S S E	S		Fl. cl.	Clear	Clear ..
17	—	29,980	,882	,976	—	85,0	86,0	82,2	... ...	... ...	... ...		S E	S E	S		Fl. cl.	Clear	Clear lightning.
18	—	30,000	—	,984	—	84,6	—	82,9	... ...	... ...	... ...		S W	—	S		Fl. cl.	—	Clear do.
19	29,940	,028	29,880	—	79,9	85,2	87,0	—	... ...	... ...	... ...	N W	S	S E	—	Fl. cl.	Fl. cl.	Clear	— do.
20	29,920	29,992	,866	29,970	80,0	83,5	86,4	83,2	... ...	... ...	3,203	S W	E	S E	S E	Fl. cl.	Fl. cl.	Clear	Clear do.
21	—	30,006	,882	,980	—	84,2	86,0	83,7	... ...	... ...	... ...		S E	S E	S		Fl. cl.	Clear	Clear do.
22	—	,030	,924	30,012	—	84,7	87,0	82,6	... ...	... ...	... ...		S E	S E	S E		Fl. cl.	Fl. cl.	Clear do.
23	—	,032	,920	29,908	—	85,8	87,0	83,9	... ...	... ...	... ...		E	E S E	S		Fl. cl.	Clear	Clear do.
24	—	,020	—	,980	—	85,2	—	84,0	0,100	... ...	... ...		E	—	S		Fl. cl.	—	Clear do.
25	—	,000	29,880	,960	—	85,8	85,6	83,8	... ...	... ...	... ...		S E	S E	S E		Fl. cl.	Cloudy	Clear do.
26	29,912	29,982	,856	,964	82,0	86,2	87,5	84,8	... ...	... ...	... ...	S E	S W	E	S E	Clear	Fl. cl.	Haze	Clear do.
27	—	30,018	,900	30,010	—	86,4	88,0	84,3	... ...	... ...	2,912		S Ebys	E S E	S E		Fl. cl.	Clear	Clear do.
28	—	,016	,904	—	—	86,3	87,5	—	... ...	... ...	... ...		N	E S E	—		Fl. cl.	Th. haze	— do.
29	—	29,976	,908	—	—	84,6	85,0	—	... ...	0,287	... ...		N E	E S E	—		Cloudy	Cloudy	— do.
30	—	,979	,890	29,944	—	82,9	83,0	82,5	... ...	1,864	... ...		W	E	S E		Rain.	Th. haze	Cloudy do. heavy dew.
Mean	29,924	29,979	29,863	29,949	80,6	85,4	87,7	84,0											

The Instrument with which the foregoing Observations are made, are placed in the Western verandah of the Honorable Company's Observatory, at about 5 feet above the surface of the ground, and 27 feet above the level of the Sea; the Thermometer was made on purpose for the Observatory, and at 75° (the only point at which a comparison has been made) it was found to differ insensibly from the Royal Society's Standard;—the Barometer is one of two Standards which I have lately constructed, and may be depended upon to 0,01 of an inch.

Longitude......	5*h.* 21*m.* 8*s.* E.
Latitude......	13° 4′ 8″,5 N.

MADRAS OBSERVATORY,
1*st October*, 1837.

T. G. TAYLOR,
H. C. Astronomer.